Campaign for Lead Free Water

April 12, 2021

Ms. Radhika Fox
Acting Assistant Administrator for Water
U.S. Environmental Protection Agency
1200 Pennsylvania Ave, NW
Washington, DC 20460

RE: Comments: Proposed Delay of Effective and Compliance Dates of National Primary Drinking Water Regulations: Lead and Copper Rule Revisions. Docket ID No. EPA-HQ-OW-2017-0300

Dear Acting Assistant Administrator Fox:

The Campaign for Lead Free Water is a national network of individuals and grassroots organizations working at the local, state, and federal level to protect communities from lead in drinking water.

We are writing to express our strong support for the Environmental Protection Agency's (EPA) March 12, 2021 proposal to delay the effective date and compliance date of the Lead and Copper Rule Revisions (LCRR) in order to complete the Agency's review of the LCRR and give drinking water systems and primacy states adequate time to prepare for compliance with the revised rule.

We are concerned that the Trump Administration's expeditious publication of the LCRR on January 15, 2021 followed a) a technical deliberations process that showed blatant disregard for the science of lead in water, and b) a public input process that was inconsistent with the requirement in 5 U.S.C. § 553(c) that the public have a meaningful opportunity to comment via public hearings, as required by the Safe Drinking Water Act (42 U.S.C. § 300g-1(d).

As we stated in the attached February 12, 2020 comments that we submitted to EPA together with a coalition of 12 clean water and environmental justice grassroots groups directly affected by lead in water, we believe that the LCRR maintains fundamental flaws in the LCR's very foundation and, in some respects, significantly undermines an already anemic rule. We are convinced today as strongly as we were convinced one year ago that unless EPA makes substantive changes to the LCRR, this rule will fly in the face of current scientific knowledge and will continue to leave our children, our families, and our communities inadequately protected – if not, at times, entirely unprotected – from lead (and copper) at the tap. It is now time, under President Biden's leadership, to align the LCRR with peer-reviewed science and with morally imperative principles of environmental justice.

The urgency of this moment is accentuated by two new developments:

1. A Centers for Disease Control and Prevention (CDC) study indicating that the upper percentiles of blood lead levels among children ages 1-11 are trending upward,[1] and

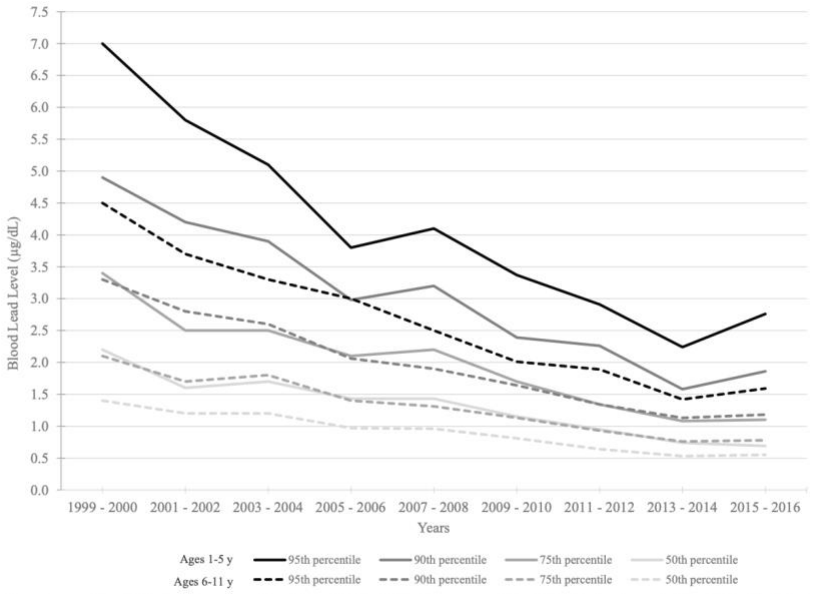

Figure 2. Selected percentiles of blood lead concentrations (in µg/dL) for U.S. children ages 1–5 y (solid line) and ages 6–11 y (dashed line) in the National Health and Nutrition Examination Survey (NHANES), 1999–2016, by 2-y survey cycle (years); data are shown in Table S2.

2. A *Guardian* and *Consumer Reports* investigation revealing that 118 of the 120 taps sampled from homes across the US had detectable levels of lead.[2] This finding demonstrates the high prevalence of lead in water nationally and highlights the fact that water systems in compliance with the LCR can leave many water users unprotected from routine exposures. Also troubling is that the one tap in the investigation that tested above the LCR's 15 mg/L lead action level (at 31.2 mg/L) dispensed lead levels that were five times higher than the average lead-in-water level in the jurisdiction (6 mg/L), as reported by the water system servicing this tap. This confirms concerns we have expressed many times: that LCR standards and reports about water system compliance with those standards do not correspond to human exposures to lead in water. Worse,

[1] The same study shows that in 2011-2016, approximately 385,775 children between 1-11 years of age had blood lead levels equal to or greater than the CDC's reference value of 5µg/dL (Egan, K. B. et al. 2021. Blood Lead Levels in U.S. Children Ages 1–11 Years, 1976–2016. *Environmental Health Perspectives* 129(3)). These levels of lead in blood were associated with non-Hispanic Black race/ethnicity, lower income background, and older housing. Given the well-established limitations of blood lead screening methods for assessing the public health impact of lead in water—e.g., fetuses and newborns dependent on reconstituted formula are rarely, if ever, screened; a significant percentage of young children are never screened; current screening practices are not designed to capture exposures to lead in water—it is likely that this number represents only the tip of the iceberg of blood lead level elevations in fetuses, infants, and children from lead-contaminated water (see, Lambrinidou, Y. 2017. Top 10 Myths About Lead in Drinking Water. *Lead Action News* 18(2):4-16; Roberts, E. M. et al. 2017. Assessing Child Lead Poisoning Case Ascertainment in the US, 1999–2010. *Pediatrics* 139(5); Schneyer, J. and M. B. Pell. 2016. Millions of American children missing early lead tests, Reuters finds. *Reuters.com* (June 9); Triantafyllidou, S. and M. Edwards. 2012. Lead (Pb) in Tap Water and in Blood: Implications for Lead Exposure in the United States. *Critical Reviews in Environmental Science and Technology* 42(13)).

[2] Felton, R., L. Gill, and L. Kendall. 2021. America's Water Crisis: We sampled tap water across the US – and found arsenic, lead and toxic chemicals. *The Guardian* (March 31).

they systematically mislead water users into a false sense of security about what is coming out of their tap.

Mounting evidence over many years reveals that, to date, the public health impact of lead in water is grossly underestimated and routinely downplayed. Indeed, peer-reviewed scientific research has established that the majority of water sampling protocols we use, including the sampling protocol for LCR compliance, are not designed to represent actual lead-in-water exposures that our fetuses, infants, and children experience on a routine basis. According to an EPA study published in January of this year,

> "…water Pb regulatory sampling protocols employ practical single samples that were not meant to estimate potential water Pb exposure at the household level, nor were they all necessarily intended to relate to health-based Pb standards. Few sampling protocols are designed to approximate human exposure by Pb ingestion through water" (Triantafyllidou, S. et al. 2021. Variability and Sampling of Lead (Pb) in Drinking Water: Assessing Potential Human Exposure Depends on the Sampling Protocol. *Environment International* 146).

At the same time, and as stated in the preamble of the 1991 LCR, under many circumstances water can be a significant, if not the primary, source of lead exposure:

> "…the total drinking water contribution to overall lead levels may range from as little as 5 percent to more than 50 percent of children's total lead exposure. Infants dependent on formula may receive more than 85 percent of their lead from drinking water. As exposures decline to sources of lead other than drinking water, such as gasoline and soldered food cans, drinking water will account for a larger proportion of total intake."

Thirty years after a) the promulgation of the LCR, b) multiple citywide lead-in-water crises with evidence of significant accompanying health harm, and c) thousands of partial lead service line replacements across the nation, which have placed us at increased risk of exposure, we must ensure that the regulation on which we rely to protect us from lead in water, indeed, protects us from lead in water.[3]

The concerns we discussed in detail in our February 12, 2020 comments still stand. Below, we provide very brief highlights of our recommendations regarding the LCR's four pillars – public education, tap monitoring, corrosion control treatment, and lead service line replacement – which must be both scientifically robust and stringent for the revised rule to be health protective. To this list we add highlights of our recommendations on the LCRR's treatment technique/lead action level framework and approach to lead in water in schools:

[3] Edwards, M., S. Triantafyllidou, and D. Best. 2009. Elevated Blood Lead in Young Children Due to Lead-Contaminated Drinking Water: Washington, DC, 2001-2004. *Environmental Science & Technology* 43:1618-1623; Edwards, M. 2014. Fetal Death and Reduced Birth Rates Associated with Exposure to Lead-Contaminated Drinking Water. *Environmental Science & Technology* 48:739-746; Hanna-Attisha, M., J. LaChance, R. C. Sadler, and A. C. Schnepp. 2016. Elevated Blood Lead Levels in Children Associated with the Flint Drinking Water Crisis: A Spatial Analysis of Risk and Public Health Response. *American Journal of Public Health* 106:283-290; Brown, M. J. 2011. Association Between Children's Blood Lead Levels, Lead Service Lines, and Water Disinfection, Washington, DC, 1998–2006. *Environmental Research* 111:67-74.

1. Public education

   In light of the fact that the LCRR does not require water utilities to deliver lead-free water at water user taps, mandate public education that discloses fully, accurately, and routinely fundamental facts about lead in water to equip people with the information required for taking effective health-protective measures. This necessitates modern-day outreach programs a) acknowledging the likelihood of lead in water in all buildings and the arbitrariness – from a public health standpoint – of the lead action level and lead trigger level, and b) delivering ongoing, proactive, and public-health-focused (rather than reactive and crisis-focused) information, rooted in the latest peer-reviewed literature on best public health communication practices about persistent and invisible environmental health risks.

2. Tap monitoring

   Mandate sampling protocols designed to capture worst-case lead-in-water levels and worst-case copper-in-water levels in highest-risk homes, as required by the LCR. This necessitates a) targeting different homes for lead (with old lead service lines) and copper (with new copper plumbing) in high-risk water quality zones, and b) for lead service line homes, analyzing both the 1st and the 5th liter samples and counting the higher of the two for MCL and 90th percentile compliance purposes. Additionally, prohibit artificial manipulation of 90th percentile calculations through the practice of a) eliminating "outliers" because they are presumed to be uncharacteristic of overall lead-in-water levels and, therefore, not worthy of inclusion in regulatory sampling results, and b) 'sampling out' by finding ways to increase the number of samples with low-lead readings.

3. Corrosion control treatment

   Replace the LCRR's compliance mechanism for corrosion control treatment with a mechanism that corresponds to lead levels at the tap in order to align the LCRR with its public-health-protective purpose. A regulatory compliance scheme that triggers a violation following an MCL exceedance or an LCR lead action level exceedance would do just that.

4. Lead service line replacement

   Mandate proactive full lead service line replacement that is funded fully by water systems; implemented at a rate of at least 10% per year, irrespective of a water system's MCL status, 90th percentile status, lead trigger level status, or lead action level status; and completed in no more than ten years. This recommendation is in direct agreement with President Biden's American Jobs Plan that emphasizes the need for prompt replacement of 100% of the nation's lead service lines. Additionally, ban partial lead service line replacement and credit water utilities for replacing all lead-bearing plumbing materials along the entire length of a service line (e.g., lead pipe; galvanized pipe; lead-bearing meters, compression fittings, goosenecks, pigtails, and connectors).

5. Treatment technique/lead action level framework

   Replace the LCR's treatment technique/lead action level framework with a more public-health-protective Maximum Contaminant Level (MCL) framework. An MCL of 5 mg/L at the tap in high-risk homes, for instance, would be easier to implement and enforce and would provide far

greater public health protection than the treatment technique framework of the LCRR. If an MCL is not adopted, provide justification for the decision and lower the LCR's lead action level to the more public-health-protective 90th percentile value of >10 mg/L. Additionally, set a reasonable future date for lowering the lead action level further to >5 mg/L.

6. Lead in water in schools

   Replace haphazard (and most likely misleading) lead-in-water sampling schemes with mandated immediate provision of lead-free water through methods such as installation of filters certified to reduce lead.

We appreciate EPA's announcement of virtual public listening sessions and community roundtables. We hope that the agency will soon propose a new science- and justice-based LCRR and hold a hearing for public comments, as required by the Safe Drinking Water Act (42 U.S.C. § 300g-1(d)).

We are eager and ready to assist EPA in developing a health-protective LCRR.

Sincerely,

Yanna Lambrinidou, PhD
Co-founder
pnalternatives@yahoo.com

Campaign for Lead Free Water • Childhood Lead Action Project • Clean Water for North Carolina
Environmental Transformation Movement of Flint • Flint Rising
Freshwater For Life Action Coalition – MKE
Lead Free MKE/Get the Lead Out Coalition – MKE • Parents for Nontoxic Alternatives
Portland Advocates for Lead-free Drinking Water • Ward 6 Public Schools Parent Organization
Water You Fighting For • Women for a Healthy Environment - Get The Lead Out PGH

February 12, 2020

Mr. Dave Ross
Assistant Administrator for Water
US Environmental Protection Agency
1200 Pennsylvania Ave, N.W. (Mail Code 4606M)
Washington, DC 20460-0001

Re: Revisions to Lead & Copper National Primary Drinking Water Regulations, Docket No. EPA–HQ–OW-2017-0300

Dear Assistant Administrator Ross,

We are a coalition of clean water and environmental justice grassroots groups who are directly affected by lead in water in our homes, schools, and communities. We appreciate the opportunity to comment on the US Environmental Protection Agency's (EPA's) proposed revisions to the Lead and Copper Rule (LCR).

Promulgated almost 30 years ago, the LCR aims at providing "maximum human health protection by reducing the lead and copper levels at consumers' taps to as close to the MCLG [Maximum Contaminant Level Goal] as is feasible."[1] EPA's MCLG for lead in water is zero.

Although the LCR has helped lower overall lead-in-water levels in jurisdictions served by large water systems, which have been required to implement corrosion control treatment irrespective of their 90th percentile lead-in-water value, ample evidence exists that the problem of lead in water in all systems – small, medium, and large – continues to be severe, widespread, routinely underestimated, and inadequately addressed. Scientific, journalistic, industry, and NGO investigations all illustrate this problem. For example:

a. A 2016 report by the international nonprofit environmental organization Natural Resources Defense Council (NRDC) revealed that, despite systematic and widespread underreporting of LCR violations by water systems and State agencies over the last two-plus decades, EPA's incomplete database shows that in 2015 alone:

[1] An MCLG is "the maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur, allowing an adequate margin of safety"; Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26478.

- → 5,363 water systems serving over 18 million people violated the LCR,[2] and
- → 1,110 water systems serving 3.9 million people exceeded the LCR's lead action level of >15 mg/L (currently, exceedance of the LCR lead action level does not, in and of itself, constitute a regulatory violation).

b. A 2015 water utility industry-funded study found that in water systems with lead service lines, use of a sampling protocol that captures worst-case lead from lead service line water would result in LCR lead action level exceedances in 54-70% of cases.[3] This means that today, 74-96 million people are being told that their tap water is safe, despite the fact that a small adjustment to standard water testing procedures would likely result in confirmation of extensive lead-in-water contamination and mandate emergency remediation interventions in their communities.

c. A 2011 Centers for Disease Control and Prevention (CDC) study found that children in a home with a partially replaced lead service line are twice as likely to have elevated blood lead levels as children in a home with an intact lead service line, and four times as likely as children in a home with no lead service line at all.[4] According to EPA, a 2004 Black and Veatch water system survey reported that 72% of LCR-mandated lead service line replacements resulted in partial replacements.[5]

Coupled with the unending chain of lead-in-water crises in cities like Washington, DC; Flint, MI; Portland, OR; Newark, NJ; Providence, RI; Pittsburgh, PA; and Sebring, OH, which has shown that, irrespective of the presence or absence of lead service lines, significant and widespread lead-in-water contamination can persist for years before it is officially acknowledged – and is often first discovered by affected residents who tend to be dismissed – these findings make one thing clear:

A major overhaul of the LCR is long overdue.

One of the LCR's most unique and troubling characteristics is that it enables water systems to achieve regulatory compliance – and make public pronouncements about their water being "safe" – even when individual taps in their service area routinely dispense lead in the tens, hundreds, and thousands of mg/L, potentially causing irreversible neurological harm, miscarriage, and fetal death. This inherent contradiction is precisely why the LCR is viewed as a "shared responsibility" Rule. Although water systems are required to prevent severe, large-scale contamination, water users are expected to make informed decisions about protecting themselves from chronic and acute exposures to lead in water in their own homes, schools, and communities.

---

[2] Violations included failures to conduct proper water sampling, implement proper corrosion control treatment, and report severe contamination to State officials and/or affected consumers.

[3] Slabaugh, R. 2014. Optimized Corrosion Control—An Estimate of National Impact (Power Point presentation). AWWA Water Quality Technology Conference (WQTC), New Orleans, LA, Nov. 16-20; Slabaugh, R., et al. 2015. National Cost Implications of Potential Long-Term LCR Requirements. *Journal AWWA* 107(8):E389-E400.

[4] Brown, M. J. 2011. Association Between Children's Blood Lead Levels, Lead Service Lines, and Water Disinfection, Washington, DC, 1998–2006. *Environmental Research* 111:67-74.

[5] US Environmental Protection Agency. 2004. U.S. EPA Lead Service Line Replacement Workshop Summary Report.

We believe that, until all lead has been eliminated from our plumbing, the LCR must mandate *enforceable* requirements that will systematically reduce lead-in-water levels across the US and arm consumers with the ongoing, complete, and accurate information they need to prevent exposures.

With this goal in mind, we urge EPA to:

a. **Follow Canada's example and consider replacing the LCR's treatment technique framework with a more public-health-protective Maximum Contaminant Level (MCL) framework**.[6] An MCL of 5 mg/L at the tap in high-risk homes, for instance, would be easier to implement and enforce and would provide far greater public health protection than the treatment technique framework currently in place. A second-best alternative would be to lower the LCR lead action level to >5 mg/L.

b. **Review all available technologies that would allow water system compliance with non-lead-related national primary drinking water regulations, *while also achieving the lowest possible levels of lead at consumer taps*.** It is our understanding that some of the compromises currently being made in corrosion control treatment are made to avoid other regulatory violations and are, in fact, unnecessary.

We also applaud EPA for proposing several important revisions. They include prohibition of pre-stagnation flushing and removal/cleaning of faucet aerators prior to or during sample collection, mandatory customer notification about LCR lead action level exceedances within 24 hours, and prohibition of counting as "replaced" lead service lines that are only partially replaced or "tested-out."[7] Should they be adopted, these revisions will improve the Rule's capacity to protect public health. Furthermore, we view the proposed mandatory lead service line inventories for all water systems and targeted communication to residents in homes with a lead service line (or a service line of unknown material) as steps in the right direction.

We are concerned, however, that EPA's proposal preserves fundamental flaws in the LCR's very foundation and, in some cases, significantly undermines an already anemic Rule. We provide detailed comments in the attached pages, which are organized in 13 sections, corresponding to sections in the agency's proposal. Below, we highlight three of these flaws to show that unless EPA makes substantive changes to its proposed revisions, the final Rule will fly in the face of current scientific knowledge and continue to leave us, our families, and our communities inadequately protected – if not, at times, entirely unprotected – from lead (and copper) at the tap. They are:

a. **The proposed tap monitoring scheme for lead (and copper) is still *not* designed to capture *worst-case* lead-in-water levels in high-risk lead service line homes, as required by the Rule**: Under the LCR, tap monitoring for lead (and copper) must target worst-case levels in high-risk homes. The entire Rule hangs on this premise. Yet EPA's proposed revisions perpetuate a sampling scheme designed *not* to capture worst-case lead-in-water levels in service areas with lead service lines (and *not* to capture worst-case copper-in-water levels in any service area at all).

---

[6] An MCL is "The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to MCLGs as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards."

[7] The LCR's "test-out" provision allows water systems with lead service lines that exceed the LCR lead action level to count as "replaced" lead service lines whose water was sampled for lead and measured ≤15 mg/L.

Should this scheme make it into the final Rule, it will continue to mislead 74-96 million consumers that their tap water is "safe" vis-à-vis lead, and it will continue to delay systematic full lead service line replacement in 54-70% of water systems with lead service lines (it will also leave most copper-in-water contaminations undetected, undisclosed, and unaddressed).[8]

b. **The proposed lead service line replacement requirement does *not* mandate proactive full lead service line replacement, while it continues to allow for partial replacement of lead service lines**: Despite mounting scientific evidence that lead service lines constitute a primary source of lead-in-water contamination and that, under certain circumstances, partial lead service line replacement can result in short- and long-term lead-in-water spikes, EPA's proposed revisions:
   - → Include a proactive full lead service line replacement program (triggered by a "lead trigger level" exceedance) that does *not* enforce full lead service line replacement,
   - → Include a reactive full lead service line replacement program (triggered by a "lead action level" exceedance) that reduces the annual rate of required lead service line replacements from 7% to 3%, and
   - → Continue to allow for partial lead service line replacement.

c. **The proposed public education requirement continues to leave people unaware that lead in water can pose a significant health risk *even when no lead service lines are present, a one-time test shows no contamination, and water systems meet LCR requirements***: Under EPA's proposed Rule, systemwide public education will continue to be mandated only when over 10% of targeted taps happen to exceed the LCR lead action level of >15 mg/L at the time of sampling. Rather than promoting precautionary water-use practices at all times, this reactive, crisis-focused approach promotes self-protection when people are likely to have already been exposed to elevated levels of lead for prolonged periods of time and to have already suffered irreversible health harm.

In short, EPA's proposed revisions are far from the long-overdue overhaul of the LCR.

We close with a note about EPA's rulemaking process because we are concerned that this process has systematically excluded a) the knowledge and recommendations of lead corrosion experts and LCR policy experts, and b) the experiences and expertise of affected community members at the forefront of a longstanding fight for a stronger LCR. We fear that these exclusions have resulted in a proposed Rule that contradicts basic lead (and copper) corrosion science;[9] is not designed to provide the public health protection required under either the LCR or the Safe Drinking Water Act (SDWA); and will continue to leave us, our families, and our communities vulnerable to routine and preventable exposures to lead (and copper) at the tap.

---

[8] See, Slabaugh, R. 2014. Optimized Corrosion Control—An Estimate of National Impact (Power Point presentation). AWWA Water Quality Technology Conference (WQTC), New Orleans, LA, Nov. 16-20; Slabaugh, R., et al. 2015. National Cost Implications of Potential Long-Term LCR Requirements. *Journal AWWA* 107(8):E389-E400.

[9] Such as, for example, the well-established facts that a) lead release from plumbing tends to be highly variable, b) any one-time lead-in-water sampling result reveals little more than the level of lead dispensed at the sampled tap at the time of sampling, c) lead-in-water levels at any one tap cannot and should not be treated as "representative" of lead-in-water levels at other taps in the same building or in the same neighborhood, and d) worst-case copper levels are most likely to occur in homes with new copper plumbing.

We find it especially disturbing that in its proposal, EPA fails to make clear that the National Drinking Water Advisory Council (NDWAC) LCR Working Group, whose recommendations it cites frequently, was assembled by EPA itself and:

a. Was heavily represented by regulated water utilities, water utility associations, and State regulators,
b. Included no lead corrosion experts or LCR policy experts, and
c. Was given no access to the scientific and policy recommendations of EPA's internal experts.[10]

Originally, the Working Group included no affected parents or lead-in-water community activists either. Following our protests, EPA invited one of us, Dr. Yanna Lambrinidou, to the group. Eighteen months later, Dr. Lambrinidou submitted a dissenting set of policy recommendations. Despite several assurances from EPA that these recommendations would be given serious consideration, and despite EPA's inclusion in its proposal of a section specifically about the Agency's "Consultation With [the] National Drinking Water Advisory Council," EPA not only fails to cite these recommendations, it also fails to acknowledge their existence.

We are not clear how EPA's rulemaking process aligns with the Agency's commitment to the environmental justice principle of meaningful public involvement. German sociologist Ulrich Beck observes that "*It is not uncommon for political programs to be decided in advance simply by the choice of what expert representatives are included in the circle of advisers.*"[11] We are concerned that EPA's choices about its circle of advisers has eclipsed perspectives, knowledges, and priorities that will be crucial for the making of a revised LCR that is better able to protect consumers from lead in tap water.

Should you have any questions, please contact Yanna Lambrinidou at pnalternatives@yahoo.com.

Sincerely,

[In alphabetical order]

M'Lis Bartlett, Carma Lewis, Mona Munroe-Younis, Benjamin Pauli, Lyndava Williams
Environmental Transformation Movement of Flint
Flint, MI

Laura Brion, Executive Director
Childhood Lead Action Project
Providence, RI

Yanna Lambrinidou, PhD
Parents for Nontoxic Alternatives
Campaign for Lead Free Water
Washington, DC

[10] Page 44 of the NDWAC LCR Working Group recommendations lists the group's members.

[11] Beck, U. 1992. *Risk Society: Towards a New Modernity*, p. 173. London, UK: SAGE Publications.

Melissa Mays
Water You Fighting For
Flint, MI

Lorie McFarlane, Dee White, Doris Cellarius
Portland Advocates for Lead-free Drinking Water
Portland, OR

Robert Miranda
Freshwater For Life Action Coalition – MKE
Milwaukee, WI

Michelle Naccarati-Chapkis
Women for a Healthy Environment - Get The Lead Out PGH
Pittsburgh, PA

Nayyirah Shariff
Flint Rising
Flint, MI

Hope Taylor, MSPH
Clean Water for North Carolina
Asheville, NC

Thomas J. Welcenbach, MA
Lead Free MKE/Get the Lead Out Coalition – MKE
Milwaukee, WI

Suzanne Wells
Ward 6 Public Schools Parent Organization
Washington, DC

SUMMARY RECOMMENDATIONS

1. GENERAL INFORMATION

Recommendation: EPA must draw on the best available peer-reviewed science and acknowledge the well-documented history of LCR's spotty implementation and enforcement to more accurately characterize the LCR's effectiveness to date. Accurate descriptions of the Rule's trajectory are important because they can strengthen the historical and technical foundation of EPA's revised regulation, support informed policymaking, and increase EPA's credibility vis-à-vis all of the agency's messaging about lead and copper in tap water.

2. BACKGROUND

Recommendation: EPA must cite the scientific studies supporting its estimates of drinking water contributions to total lead intake; scrutinize, reassess, and revise these estimates to reflect the best available peer-reviewed science as well as national blood lead screening participation rates and reporting irregularities; include in its discussion the best available peer-reviewed science on the relationship between lead in water and miscarriage/stillbirth. Accurate characterizations of the health risks of lead-contaminated tap water are important because they can strengthen the scientific foundation of EPA's revised regulation, improve the LCR's capacity to protect public health, increase EPA's credibility vis-à-vis all of the agency's messaging about lead at the tap, and better equip consumers to prevent exposures.

3. LEAD TRIGGER LEVEL

Recommendation: EPA must explain why a 90th percentile value >15 mg/L is considered feasible as the Rule's lead action level, whereas a 90th percentile value >10 mg/L is not, given that both values trigger mandatory requirements. EPA's explanation must reflect the best available peer-reviewed science, the agency's responsibility to promote and protect environmental justice, and the LCR's public health goal:

a. If a compelling explanation *cannot* be provided, we ask EPA to *immediately* lower the LCR's lead action level to the more public-health-protective 90th percentile value of >10 mg/L (and set a reasonable future date for lowering the level further to >5 mg/L).

b. If a compelling explanation *can* be provided, we urge the agency to strengthen the proposed trigger level requirements in order to ensure that:
   - → Public notification targets *all* consumers,
   - → Small system remedial options for future LCR lead action level exceedances are science-based and not likely to leave consumers at prolonged risk of exposure,
   - → Medium and large system requirements for full lead service line replacement mandate *actual* full lead service line replacement, and
   - → Large system corrosion control treatment re-optimization complies with the LCR's corrosion control treatment "optimization" definition for large water systems.

4. CORROSION CONTROL TREATMENT

Recommendation: We urge EPA to replace the LCR's current compliance mechanism for corrosion control treatment with a mechanism that corresponds to lead levels at the tap and increases public health protection. If left in place, the current mechanism will continue to

penalize water systems for failure to maintain water quality parameters within State-designated "optimal" ranges, even if such failure has no effect on lead-in-water levels in consumer homes. Conversely, it will continue to "reward" water systems for success in maintaining water quality parameters within State-designated "optimal" ranges, even when lead-in-water contamination in their service area is severe. Should EPA leave the current mechanism in place, it must provide peer-reviewed science showing that:

a. Optimized water quality parameter levels (and for the specific narrow set of parameters the agency has proposed) are reliable predictors of lead-in-water levels at consumer taps; and
b. Water system maintenance of "optimal" water quality parameter ranges has prevented large-scale lead-in-water contamination in cities like Washington, DC; Flint, MI; Portland, OR; Newark, NJ; Pittsburgh, PA; and Sebring, OH.

Additional recommendations concern water quality parameters, water quality zones, small and medium system water quality monitoring, large water system corrosion control re-optimization, source water or water chemistry changes, and corrosion control treatment decisions/ assessments.

5. LEAD SERVICE LINE INVENTORY

Recommendation: We commend EPA for proposing complete and systematic inventories of the entire length of lead service lines (in both public and private space) and agree with the justification offered for this requirement. We also urge EPA to strengthen two components of its proposal: a) inventory content (it must be thorough and complete, acknowledging the multiple lead-bearing components that can lie between a service line and a home's internal plumbing), and b) transparency (people must have easy access to information about *which* portions of their service line have been identified, *when*, and *how* as well as where lead service lines exist in their communities).

6. LEAD SERVICE LINE REPLACEMENT

Recommendation: Regulations without enforcement are little more than suggestions. Therefore, for many water systems with lead service lines (or service lines of unknown material), EPA's proposed full lead service line replacement requirement seems like little more than a (taxing and dreaded) suggestion. Moreover, for water systems that exceed the LCR lead action level, the proposal to reduce the annual rate of required lead service line replacements from 7% to 3% will cause significant – if not indefinite – delays in the full replacement of lead service lines. In addition, it raises serious environmental justice concerns as well as concerns about regulatory backsliding. We urge EPA to, once and for all, *ban partial lead service line replacement* and *mandate enforceable and proactive full lead service line replacement* that is:

a. Funded fully by water systems;
b. Implemented at a rate of at least 10% per year, irrespective of a water system's 90th percentile value, lead trigger level status, or lead action level status;
c. Completed in no longer than ten years;
d. Coupled with the provision of lead-certified filters; and
e. Accompanied by the delivery of scientifically accurate information, disclosing the likelihood of ongoing short- and long-term lead-in-water contamination from:
    → Internal plumbing that can "absorb" lead from lead service lines and can release it in the future, and/or

→ Other lead-bearing plumbing materials, such as lead solder and leaded brasses.

Additional recommendations concern water systems' legal authority vis-à-vis lead service line replacement in private space; collaboration with consumers; goal-based full lead service line replacement following lead trigger level exceedances; mandatory full lead service line replacement following lead action level exceedances; full lead service line replacement in the course of planned infrastructure work; replacement of lead-bearing meters, compression fittings, goosenecks, pigtails, and connectors in the course of planned and emergency infrastructure work; and public messaging regarding health risks associated with physical disturbances of lead-bearing plumbing. Finally, we urge EPA to provide the scientific basis for several proposals pertaining to post-replacement water sampling and consumer notification, post-replacement filter provision, and public-space lead service line replacement following consumer-initiated replacement of lead service lines in private space.

7. Compliance Alternatives for a Lead Action Level Exceedance for Small Community Water Systems

Recommendation: The flexibilities EPA proposes to grant to small water systems in order to help them maintain regulatory compliance following a LCR lead action level exceedance raise serious questions about the agency's a) scientific rationale, b) perpetuation of a well-documented and widespread environmental injustice that has allowed small water systems to routinely deliver unsafe drinking water to millions of water users, and c) potential regulatory backsliding. We urge EPA to tighten its proposed flexibility offerings by requiring:

→ Corrosion control treatment when water systems choose the full lead service line replacement option,
→ Full lead service line replacement when they choose the corrosion control treatment option, and
→ Full lead service line replacement when they choose the point-of-use (POU) filter option.

Should the agency leave its proposal unchanged, it must disclose the peer-reviewed science and the environmental justice principles that justify these flexibilities.

8. Public Education

Recommendation: Although EPA's proposal for a revised public education requirement includes some notable improvements, it continues to be based on a fundamentally flawed premise – that frequent, robust, multi-media, and systemwide public education about lead in water is needed primarily when a water system exceeds the LCR lead action level and contamination is severe and widespread. Despite public calls for significant changes to the LCR's public education requirement that take into account consumers' *constant* vulnerability to lead-in-water exposures, the Rule's "shared responsibility" regime, and the urgent need for public messaging that stresses the importance of adopting precautionary water use practices that minimize lead exposures in *all buildings* and at *all times, even when water systems meet LCR requirements*, EPA's proposal leaves the essence of the Rule's public education requirement largely unchanged. Almost 30 years after the LCR's promulgation, EPA must finally mandate a revised public education requirement that:

a. Acknowledges the likelihood of lead in water in all buildings and the arbitrariness – from a public health standpoint – of the lead action level and the proposed lead trigger level;
b. Delivers *ongoing*, *proactive*, *public-health-focused* (rather than reactive, crisis-focused) public education, which does not downplay the risks of lead in water, is accessible, and

appears in multiple languages and media (e.g., online, via text messaging, broadcast media, and postings at public locations);
c. Includes public notification following copper action level exceedances.

Should EPA leave its proposal unchanged, it must a) cite risk communication research that justifies the public education scheme outlined, showing its potential to succeed in reaching consumers and fostering informed and health-protective decision-making, b) address studies identifying significant deficiencies in Consumer Confidence Report effectiveness, c) provide data on the percent of consumers who read the lead and copper section of their Consumer Confidence Report and who have adopted precautionary water use practices as a result of information in this Report, and d) explain how the Rule's complete absence of public education/ notification requirements following copper action level exceedances complies with the Safe Drinking Water Act's (SDWA's) Public Notification Rule.

9. MONITORING REQUIREMENTS FOR LEAD AND COPPER IN TAP SAMPLING

Recommendation: We applaud EPA for proposing to strengthen regulatory compliance sampling methods and increase data transparency. Despite this promising development, however, the agency's proposed lead and copper monitoring requirements would still leave:

a. Worst-case contamination routinely undetected in many service areas across the US, including and especially those areas with lead service lines and, thus, with the highest overall risk of contamination; and
b. Water users inadequately informed about lead-in-water levels in their communities.

We urge EPA to make additional revisions to the monitoring requirements so that they reflect the best available peer-reviewed science and align with the public health goal of the Rule. These revisions must *first and foremost* mandate sampling of worst-case lead levels in lead service line water and of worst-case copper levels in homes with new copper plumbing. We also recommend changes to the LCR lead action level, the analytical protocol for the detection of lead in water samples, and the proposed data transparency requirement. Should EPA leave its proposal unchanged, it must present the peer-reviewed science showing how:

a. A single 1st-draw sampling protocol in a >15 mg/L LCR lead action level regime and a >10 mg/L trigger level scheme maximizes the chances of capturing worst-case lead levels in highest-risk lead service line homes and achieves maximal human health protection by reducing lead at consumer taps to as close to the Maximum Contaminant Level Goal (MCLG) as feasible, as required by the LCR;
b. Regulatory compliance sampling for copper in homes with old copper plumbing maximizes the chances of capturing worst-case copper levels in a service area, as required by the LCR; and
c. The new data transparency requirement aligns with environmental justice principles.

10. WATER QUALITY PARAMETER MONITORING

Recommendation: Given:

a. The available peer-reviewed science on associations between lead corrosion and water quality parameters beyond pH, alkalinity, orthophosphate, and silicate (e.g., chlorides, sulfates, manganese, iron, aluminum), and

b. The LCR's ultimate goal of providing "maximum human health protection by reducing the lead and copper levels at consumers' taps to as close to the MCLG [Maximum Contaminant Level Goal] as is feasible,"[12]

we urge EPA to expand the proposed water quality parameter list to *all* the factors known to significantly impact lead corrosion and lead release. Should EPA leave its proposed list unchanged, it must provide a scientifically defensible justification for its narrow scope. Additional recommendations concern small and medium water system water quality parameter monitoring, water quality zones, find-and-fix water quality parameter monitoring, and reduced monitoring.

11. Public Education and Sampling at Schools and Child Care Facilities

Recommendation: Although we appreciate EPA's attempt to address lead in water in schools and childcare facilities through the LCR, we are concerned that the agency's proposal goes against the best available peer-reviewed science and the American Academy of Pediatrics (AAP) recommendation for lead in water in schools, does not mandate remediation of identified contamination, and risks leaving school and childcare communities falsely assured and sub-optimally protected – if not entirely unprotected – from continued risk of preventable exposures. We urge EPA to center this requirement not on haphazard (and most likely misleading) lead-in-water sampling, but on routine and robust public education that supports *all* school and childcare communities to make informed decisions about *immediate* adoption of effective protective measures at *all* taps used for drinking and cooking. Should the agency leave its proposal unchanged, it must disclose:

a. The peer-reviewed science showing how the tap sampling scheme it outlines will generate scientifically accurate public messaging and how this public messaging will, in turn, result in *scientifically-sound*, *measurable*, *overseeable*, and *enforceable* remedial actions that reduce exposures to lead in water, as required by the LCR; and
b. How it aligns with environmental justice principles.

12. Find-and-Fix

Recommendation: Although we appreciate EPA's intent to follow-up with remedial actions when a 1st-draw compliance sample measures >15 mg/L, we are concerned that the proposed requirement lacks a scientific basis, is haphazard and arbitrary, and risks leaving affected residents inadequately protected – if not entirely unprotected – from ongoing lead-in-water exposures. We urge EPA to center any find-and-fix program on *immediate* and *effective* remediation at home/s with lead-in-water contamination >15 mg/L and on *prompt* systemwide public education. Should EPA leave its proposal unchanged, it must disclose the peer-reviewed science supporting it. It must also make clear what mechanisms it will incorporate into a find-and-fix requirement to prevent perpetuation of environmental injustice from vastly uneven water system responses to individual >15 mg/L compliance sampling results (e.g., based on a water system's resources or on who the affected residents are and what neighborhoods they reside in).

[12] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26478.

13. Rule Implementation and Enforcement

Recommendation: We recommend that EPA tightens its proposal regarding service line material verification, lead service line replacement following lead trigger level exceedances, and the find-and-fix program, in order to increase the likelihood that, if adopted, these requirements will generate scientifically sound and public health protective interventions.

COMMENTS

1. GENERAL INFORMATION

We appreciate the background in the "General Information" section of the proposed Rule because we believe that the LCR's almost 30-year history has much to teach us about the Rule's strengths and weaknesses and must play a guiding role in EPA's imminent regulatory revisions. For this reason, we find it imperative that the "general information" provided in the Rule is complete and accurate and that it does not mislead water users, lawmakers, or the press. In this context, we raise concerns about the accuracy of the below statement:

> *"Since the implementation of the Lead and Copper Rule (LCR), drinking water exposures have declined significantly, resulting in major improvements in public health. For example, the number of the nation's large drinking water systems that have exceeded the LCR action level of 15 parts per billion has decreased by over 90 percent and over 95 percent of the all water systems have not reported an action level exceedance in the last three years (EPA–815–F–19–007)."*

This statement, although partly correct, overlooks evidence showing water systems' systematic and widespread use of a) lead-in-water sampling protocols known to miss lead, and b) irregularities in reporting lead-in-water levels to State oversight agencies and EPA.[13] It also fails to acknowledge a) that the one 1st-draw sample per tap required under the LCR for regulatory monitoring can easily miss worst-case lead-in-water levels because lead release is highly variable at all taps with lead-bearing plumbing,[14] and b) new research showing that in water systems with lead service lines, use of a sampling protocol that captures lead service line water would result in LCR lead action level exceedances in 54-70% of cases, impacting an estimated 74-96 million water users.[15]

We recommend that EPA:

a. **Acknowledges these findings, and**
b. **Draws on the best available peer-reviewed science as well as the documented history of LCR's spotty implementation and enforcement to characterize the effectiveness of the LCR more accurately by inserting in its statement the necessary disclosures, clarifications, and nuance.**

---

[13] C. D. Leonnig and D. Nakamura. 2004. Lead Levels in Water Misrepresented Across U.S. *The Washington Post* (10/5); Milman, O. 2016. US Authorities Distorting Tests to Downplay Lead Content of Water. *The Guardian* (1/22); Milman, O. and J. Glenza. 2016. At least 33 US Cities Used Water Testing 'Cheats' Over Lead Concerns. *The Guardian* (6/2); NRDC 2016 report "What's In Your Water? Flint and Beyond."

[14] Schock, M. R. and F. G. Lemieux. 2010. Challenges in Addressing Variability of Lead in Domestic Plumbing. *Water Science & Technology: Water Supply* 10(5):792-798; Masters, S., J. Parks, A. Atassi, and M. Edwards. 2016. Inherent Variability in Lead and Copper Collected During Standardized Sampling. *Environmental Monitoring and Assessment* 188(3):177.

[15] Slabaugh, R. 2014. Optimized Corrosion Control—An Estimate of National Impact (Power Point presentation). AWWA Water Quality Technology Conference (WQTC), New Orleans, LA, Nov. 16-20.

2. BACKGROUND

For the same reasons as above, we find it imperative that the "background" provided about the health effects of lead in water is complete and accurate. In this context, we have concerns about the below two statements:

a. *"The EPA estimates that drinking water can make up 20 percent or more of a person's total exposure to lead (56 FR 26548, June 7, 1991)."*

b. *"Infants who consume mostly mixed formula made from tap water can, depending on the level of lead in the system and other sources of lead in the home, receive 40 percent to 60 percent of their exposure to lead from drinking water used in the formula."*

EPA must provide the scientific basis for these estimates as well as the peer-reviewed science that supports them.[16]

The 40-60% estimate raises several questions. For example, where would the remaining 60-40% of the assumed lead intake originate for infants between 0 and 3 months of age who a) are not consuming solid foods, and b) are not yet mobile enough to be in contact with lead-containing paint, dust, or soil? It stands to reason that many infants doing little more than drinking and sleeping would have a total lead exposure closer to 100 percent from drinking water. It is also important to note that this estimate differs significantly from the statement below, featured in the current LCR:

> *"For residents of houses and buildings with relatively new lead solder or lead service lines, drinking water can be the primary source of exposure, especially if the water is corrosive. As such, the total drinking water contribution to overall lead levels may range from as little as 5 percent to more than 50 percent of children's total lead exposure. Infants dependent on formula may receive more than 85 percent of their lead from drinking water. As exposures decline to sources of lead other than drinking water, such as gasoline and soldered food cans, drinking water will account for a larger proportion of total intake."*

Further, a) national blood lead screening requirements, and b) environmental risk assessments at the homes of children with elevated blood lead levels, are not designed to detect drinking water as a source of lead, even when tap water is the *sole* or *primary* source of exposure. In fact, the blood lead

---

[16] See, for example, Triantafyllidou, S., J. Parks, and M. Edwards. 2007. Lead Particles in Potable Water. *Journal AWWA* 99(6):107-117; Edwards, M., S. Triantafyllidou, and D. Best. 2009. Elevated Blood Lead in Young Children Due to Lead-Contaminated Drinking Water: Washington, DC, 2001-2004. *Environmental Science & Technology* 43:1618-1623; Brown, M. J. 2011. Association Between Children's Blood Lead Levels, Lead Service Lines, and Water Disinfection, Washington, DC, 1998–2006. *Environmental Research* 111:67-74; Triantafyllidou, S. and M. Edwards. 2012. Lead (Pb) in Tap Water and in Blood: Implications for Lead Exposure in the United States. *Critical Reviews in Environmental Science and Technology* 42:1297–1352; Triantafyllidou, S., D. Gallagher, and M. Edwards. 2014. Assessing Risk with Increasingly Stringent Public Health Goals: The Case of Water Lead and Blood Lead in Children. Journal of Water and Health 12(1):57-68; Edwards, M. 2014. Fetal Death and Reduced Birth Rates Associated with Exposure to Lead-Contaminated Drinking Water. *Environmental Science & Technology* 48:739-746; Hanna-Attisha, M., J. LaChance, R. C. Sadler, and A. C. Schnepp. 2016. Elevated Blood Lead Levels in Children Associated with the Flint Drinking Water Crisis: A Spatial Analysis of Risk and Public Health Response. *American Journal of Public Health* 106:283-290; Pieper, K. J. 2018. Elevated Lead in Water of Private Wells Poses Health Risks: Case Study in Macon County, North Carolina. *Environmental Science & Technology* 52:4350−4357.

surveillance system currently in place misses both chronic and acute exposures to lead in water. Specifically:

a. The two most vulnerable populations to lead at the tap – fetuses and infants dependent on reconstituted formula – are rarely tested for lead in blood;

b. A significant percentage of young children are never tested for lead in blood, and when they are tested their results often go unreported;[17]

c. Recommended strategies for blood lead screening are not designed to capture exposures to lead at the tap. Target children are around the ages of 1 and 2, prone to putting their hands in their mouth and living in areas with housing presumed to contain deteriorating lead paint.[18] More importantly, environmental risk assessments in their homes rarely include tap water sampling. When they do, the sampling is almost always inadequate for capturing potential contamination (e.g., due to inadequate stagnation prior to sampling, lack of sequential samples for the detection of lead particles, etc.).

Coupling these shortcomings with the latest science on lead in drinking water (e.g., concerning partially replaced lead service lines, acute health risks posed by ingestion of particulate lead, long-term lead spiking following physical disturbances to lead service lines),[19] we are confronted with a picture which suggests that significant exposures to lead in water and significant chronic and acute elevations of lead in blood have systematically gone undetected.

We urge EPA to scrutinize, reassess, and revise its estimates of drinking water contributions to total lead intake. Since the promulgation of the LCR, numerous technical presentations have been made at conferences and numerous peer-reviewed papers have been published suggesting that older estimates are largely based on inappropriate sampling protocols, which likely underestimate actual lead-in-water levels and exposure potential.[20]

Similarly, we are concerned about the accuracy of the statement below:

a. *"During pregnancy, lead exposure may affect prenatal brain development."*

---

[17] Roberts, E. M., et al. 2017. Assessing Child Lead Poisoning Case Ascertainment in the US, 1999–2010. *Pediatrics* 139(5).

[18] Schneyer, J. and M. B. Pell. 2016. Millions of American Children Missing Early Lead Tests, Reuters Finds. *Reuters* (6/9).

[19] See, for example, Triantafyllidou, S., J. Parks, and M. Edwards. 2007. Lead Particles in Potable Water. *Journal AWWA* 99(6):107-117; Brown, M. J. 2011. Association Between Children's Blood Lead Levels, Lead Service Lines, and Water Disinfection, Washington, DC, 1998–2006. *Environmental Research* 111:67-74; Del Toral, M. A. et al. 2013. Detection and Evaluation of Elevated Lead Release from Service Lines: A Field Study. *Environmental Science & Technology* 47(16): 9300–9307.

[20] Schock, M. R. and F. G. Lemieux. 2010. Challenges in Addressing Variability of Lead in Domestic Plumbing. *Water Science & Technology: Water Supply* 10(5):792-798; Riblet, C. et al. 2019. True Exposure to Lead at the Tap: Insights from Proportional Sampling, Regulated Sampling and Water Use Monitoring. *Water Research* 156(1):327-336.

EPA must revise this statement to take into account the best available peer-reviewed science on the association between lead in water and miscarriage/stillbirth.[21]

Finally, we are concerned about the statement below implying that EPA and State primacy agencies provide adequate enforcement of the LCR:

> *"State primacy requires, among other things, adequate enforcement (including monitoring and inspections) and reporting."*

History has shown that State primacy can continue uninterrupted even when the LCR is sub-optimally enforced. According to the 2016 Natural Resources Defense Council (NRDC) report "What's In Your Water? Flint and Beyond," problems with LCR's regulatory enforcement are widespread. Specifically, the report states that:

> *"…according to the EPA's data, states and the EPA took formal enforcement action against just 11.2 percent of the over 8,000 violations that occurred in 2015—leaving 88.8 percent free from any formal enforcement action. Formal enforcement actions were taken against less than one in five health-based violations (17.6 percent). Furthermore, penalties were sought or assessed for only a tiny fraction (3 percent) of violations. This lack of accountability sends a clear message to water suppliers that knowingly violate the Lead and Copper Rule, with state and federal complicity: There is no cop on the beat."*

EPA must comment on NRDC's finding and spell out how the revised LCR will address the serious problem it raises.

3. Lead Trigger Level

EPA's trigger level proposal is exceedingly difficult to follow and has left us more confused than enlightened about the agency's intent and vision. Certainly, we appreciate the potential benefits of a 90th percentile lead trigger level as "a reasonable threshold" to require water systems to take a progressive set of preliminary actions that will a) reduce lead levels at the tap, and b) allow water systems to better prepare for any future LCR lead action level exceedance without the urgency and pressure of an *actual* LCR lead action level exceedance.

We are concerned, however, that EPA's proposal fails to explain why a 90th percentile value >15 mg/L is considered feasible as the Rule's lead action level, whereas a 90th percentile value >10 mg/L and ≤15 mg/L is not, given that both values trigger mandatory requirements. **We urge EPA to disclose its feasibility calculations in a way that answers this question. EPA's explanation must reflect the best available peer-reviewed science, the agency's responsibility to promote and protect environmental justice, and the LCR's public health goal.**

If a compelling explanation *cannot* be provided, we ask EPA to immediately lower the LCR's lead action level to the more public-health-protective 90th percentile value of >10 mg/L (and set a reasonable future date for lowering the level further to >5 mg/L).

---

[21] For example, Edwards, M. 2014. Fetal Death and Reduced Birth Rates Associated with Exposure to Lead-Contaminated Drinking Water. *Environmental Science & Technology* 48:739-746.

If a compelling explanation *can* be provided, we recommend that the agency:

a. **Strengthen the proposed trigger level requirements to ensure that they reflect the best available peer-reviewed science, the agency's responsibility to promote and protect environmental justice, and the LCR's public health goal. Specifically**:

→ **Public notification**: When a system's water is corrosive, homes, apartments, and other buildings *without* a lead service line (and/or without service lines of unknown material) can have significant lead-in-water contamination from lead-bearing plumbing like lead solder, leaded brasses, bronze fittings, and galvanized pipes downstream of a removed lead service line. For this reason, *all customers* (whether or not they have a lead service line) in *all water systems* (small, medium, and large) must be notified about a trigger level exceedance, so that they can take appropriate measures to protect themselves from potential exposures.

→ **Small water system remediation options (full lead service line replacement)**: Small water systems with lead service lines (and/or service lines of unknown material) must *not* be allowed to select full lead service line replacement *without* corrosion control treatment implementation/optimization as their future remediation plan of choice (if they exceed the LCR lead action level), unless they can show that, following a LCR lead action level exceedance, lead-in-water levels at highest-risk homes with no lead service lines (that are most likely to have worst-case lead-in-water levels) fall consistently below the LCR lead action level. Otherwise, the proposed trigger level risks creating situations wherein, following a LCR lead action level exceedance, implementation of corrosion control treatment necessary for the reduction of lead from non-lead-service-line plumbing materials can be delayed for months or years until most lead service lines in a water system are fully replaced, and compliance monitoring starts targeting highest-risk non-lead-service-line homes and reveals significant contamination.

→ **Small water system remediation options (corrosion control treatment)**: Small water systems with lead service lines (and/or service lines of unknown material) must *not* be allowed to select corrosion control treatment *without* full lead service line replacement as their future remediation plan of choice (if they exceed the LCR lead action level). This is especially important since EPA presents the corrosion control treatment option as particularly appropriate for small water systems with "*many [lead service lines] to replace*" (emphasis added). We now know that the health hazard of lead service lines is not only severe but also indefinite (lead service lines are extremely durable). In addition, even the most effective corrosion control treatment is unable to completely prevent lead leaching from *any* lead-bearing plumbing, let alone lead service lines that are made of 100% pure lead. Moreover, there are many *ordinary* conditions unrelated to corrosion control treatment that can accelerate lead release from such lines (e.g., increased age of line, increased water temperatures, water stagnation in the lines, low water flow). Water users in homes with lead service lines are *especially* vulnerable to chronic and acute exposures due to:

- Physical disturbances of lead service lines caused by water-related and non-water-related utility work (in most jurisdictions, such work takes place daily

and can dislodge and release scale and sediment, which can contain excessively high levels of lead).[22]

- Prolonged periods of no water use resulting from lack of occupancy. When unoccupied homes are subsequently re-occupied, they can pose an immediate and acute health risk to incoming residents due to the disintegration of lead-bearing scales and sediment in lead service lines. The same type of disintegration can occur in lead service line homes with routine low water usage.[23]

Failure of the revised LCR to require the full removal of lead service lines in small systems will risk leaving many of these lines in operation for decades, if not centuries, and will raise serious environmental justice concerns.

→ **Small water system remediation options (filters)**: Small water systems with lead service lines (and/or service lines of unknown material) must *not* be allowed to select the POU filter option *without* full lead service line replacement as their future remediation plan of choice (if they exceed the LCR lead action level). We now know that the health hazard of lead service lines is not only severe but also indefinite (lead service lines are extremely durable). Failure of the revised LCR to require the full removal of lead service lines in small systems will risk leaving many of these lines in service for decades, if not centuries, and will raise serious environmental justice concerns. Should EPA leave this flexibility unchanged, it must provide an explanation about how it aligns with environmental justice principles.

We also recommend that the POU filter option mandates the use of filters that meet the most stringent standards available for the removal of both soluble and particulate lead.[24] The sampling protocol employed to monitor filter effectiveness must be *EPA-prescribed* and water system modifications must be prohibited. In light of the new *NSF/ANSI 53: Drinking Water Treatment Units* standard of ≤5 mg/L, samples must be ≤5 mg/L; consumers must receive results within 24 hours; and the information delivered must state clearly that no level of lead in water is safe for human consumption.

→ **Medium and large water system full lead service line replacement requirement**: Medium and large water systems with lead service lines (and/or service lines of unknown material) must be required to implement full lead service line replacement programs that comply with basic *EPA-prescribed* standards and goals for *actual* lead service line replacement. These standards and goals *must be enforceable*. EPA's proposal that water systems exceeding the lead trigger level be left on their own to

---

[22] Del Toral, M. A. et al. 2013. Detection and Evaluation of Elevated Lead Release from Service Lines: A Field Study. *Environmental Science & Technology* 47(16): 9300–9307.

[23] Arnold, R., and M. Edwards. 2012. Electrochemical Reversal of Galvanic Pb:Cu Pipe Corrosion. *Environmental Science & Technology* 46(20):10941-10947.

[24] Currently, this is the new *NSF/ANSI 53: Drinking Water Treatment Units* standard for lead reduction to 5 mg/L or less *in conjunction with* the *NSF/ANSI 42* standard for particulate Class I reduction.

implement full lead service line replacement with a self-set goal (to be approved by the State), leaves room for:

- Significant variation in lead service line replacement programs (e.g., one water system might decide to replace all its lead service lines in ten years, while another in 80 years or never) and, therefore, uneven public health protection from water system to water system; and

- Systematic perpetuation of environmental injustice, given EPA's recommendation that water systems develop their programs on the basis of several factors, including "*the financial circumstances of the water system and its customers*."[25] (emphasis added)

Additionally, EPA's proposal that water systems be deemed in violation of the LCR *not* when they fail to meet their self-set goal, but when they fail to conduct some form of loosely prescribed public outreach activity aimed at getting homeowners to participate in their full lead service line replacement program, is inappropriate from both a regulatory and an environmental justice standpoint. Such an arrangement would:

- Allow water systems to practically abdicate their responsibility to protect consumers from lead-service-line lead by transferring part, if not all, of the burden of full lead service line replacement to consumers; and it would give them more leeway to blame consumers for programs that don't go as imagined.[26]

- Not hold water systems accountable for:
  - Full lead service line replacement programs that might be financially difficult or impossible for all consumers to take part in;
  - Public outreach activities that might consistently fail to reach all consumers; and
  - Public outreach activities that might routinely leave at least some consumers confused or overwhelmed.

- Ignore that lead service lines were rarely chosen by consumers and, in the case of many jurisdictions, were mandated by law. Municipal codes requiring the use of lead service lines were commonplace, starting in the mid-1800s.[27] Chicago, for example, the city with the largest known concentration of these lines, mandated their installation until 1986 (i.e., the year of the Safe Drinking Water Act (SDWA) amendments that banned lead plumbing materials). In jurisdictions with plumbing codes requiring the use of lead service lines,

[25] Active research at American University in Washington, DC is looking precisely at "whether Washington, DC's voluntary (cost-share) approach to financing lead service line (LSL) replacement results in lower levels of replacement among low-income and minority residents."

[26] The water utility industry's culture of condescension and disrespect toward the public was discussed in the October 28, 2015 recommendations of National Drinking Water Advisory Council (NDWAC) LCR work group dissenting member Yanna Lambrinidou, PhD.

[27] Toesken, W. 2008. The Great Lead Water Pipe Disaster. Cambridge, MA: MIT Press.

homeowners could not request alternative materials, even if they were aware of and concerned about lead's toxicity.[28] In *The Great Lead Water Pipe Disaster* (2008), professor of economics Werner Troesken explains that erroneous understandings about the safety of lead service lines were widespread not only among plumbers, but also among several groups of trusted professionals, including public officials and medical experts. Yet these understandings were often used to "educate" consumers and even dispel public fears about lead in plumbing. This history raises serious moral and environmental justice questions about perpetuating a lead-in-water regulation that places partial (if not at times full) responsibility on consumers for eliminating this hazard.

In short, water utility "effort to reach out" to consumers is not an appropriate, meaningfully measurable, or public health protective regulatory requirement. If implemented, it will make space for long-term and even indefinite delays of full lead service line replacement in systems exceeding the LCR trigger level but meeting the LCR lead action level. In fact, it is bound to make such delays highly likely.

→ **Large water system corrosion control re-optimization**: Under the current LCR, "optimized" corrosion control treatment for large water systems refers to treatment that achieves *the lowest possible levels of lead at consumer taps* without violating any other national primary drinking water regulation. According to EPA lead corrosion expert Mike Schock, to date, no large water system has conducted the corrosion control studies mandated by the Rule to identify optimized corrosion control treatment as intended.[29] Instead, for almost three decades, large water systems and their primacy agencies have deemed corrosion control treatment "optimized" simply when 90th percentile values have met the LCR lead action level, irrespective of the system's ability to achieve further systemwide lead-in-water reductions. This constitutes a gross misinterpretation of the LCR, which from a public health perspective becomes even more troubling when one considers that a) the mandated 1st-draw sampling protocol does not capture worst-case lead in lead service line homes, and b) many water systems with and without lead service lines have been using sampling protocols known to temporarily reduce lead-in-water levels at the tap and, thus, have been underestimating their 90th percentile value. If, under the revised LCR, a large water system exceeds the trigger level, it must be required to:

- Conduct a comprehensive study of *all* the factors that contributed to the exceedance (not just the short list of water quality parameters in the current LCR);[30]

---

[28] Rabin, R. 2008. The Lead Industry and Lead Water Pipes: "A Modest Campaign." *American Journal of Public Health* 98(9):1584-1592.

[29] Personal communication, February 1, 2020.

[30] Peer-reviewed science shows that there are many more water quality factors that can affect lead corrosion and lead release than the ones in the proposed water quality parameter list (see, Schock, M. R., et al. 2014. Importance of Pipe Deposits to Lead and Copper Rule Compliance. *Journal AWWA* 106(7):E336-E349; Wasserstrom, L. W., et al. 2017. Scale Formation Under Blended Phosphate Treatment for a Utility With Lead Pipes. *Journal AWWA* 109(11):E464-E478; Tully, J., M. K. DeSantis, and M. R. Schock. 2019. Water quality–Pipe Deposit Relationships in Midwestern Lead Pipes. *AWWA Water Science* 1(2):e1127).

- Implement optimized/re-optimized corrosion control treatment that results in the lowest possible 90th percentile value, *even if other water treatments must be adjusted*;[31]
- Once the proper goal is achieved, set optimal water quality parameter ranges for *all* relevant parameters, as appropriate for the specific system, which would then be monitored on a regular basis.

b. **Provide an estimate of the number of water systems the LCR trigger level will affect and number of customers it will benefit.**

4. CORROSION CONTROL TREATMENT

a. **Compliance mechanism:** We are concerned that EPA's proposed revisions maintain unchanged one of the LCR's most flawed components: the compliance mechanism for corrosion control treatment, which lacks a direct association with lead levels at consumer taps.

Under the current LCR, a water system is deemed *compliant* with the Rule's corrosion control treatment requirements (and the Rule itself) if it manages to maintain its water quality parameters within the "optimized" ranges designated by the State. Conversely, a water system is deemed in *violation* of the Rule's corrosion control treatment requirements (and the Rule itself) if its water quality parameters fall outside these ranges. The problem with this mechanism is that water system maintenance of "optimized" water quality parameters *does not directly correspond to actual lead levels at consumer taps*. In other words, the LCR's water quality parameter compliance framework penalizes water systems for failure to maintain specific water quality conditions, even if such failure has no effect on lead-in-water levels in consumer homes. Conversely, this framework "rewards" water systems for success in maintaining their water quality parameters within "optimal" ranges, even when lead-in-water contamination in their service area is severe.

In practice, this disconnect translates into the following statistics:

According to a 2014 presentation to the EPA National Drinking Water Advisory Council (NDWAC) LCR work group by Region 5 regulations manager Miguel Del Toral, since 1991 only *172 water systems* had failed to maintain State-designated optimized water quality parameter ranges. Yet *over 6,000 water systems* had exceeded the LCR lead action level (and thousands had exceeded

the LCR copper action level). The former group of water systems were deemed in violation of the LCR. The latter group were not. One of the 6,000+ water systems that was deemed compliant was the Washington, DC Water and Sewer Authority (DC WASA), which in 2001-2004 allowed

[31] In light of the fact that the Maximum Contaminant Level Goal (MCLG) for lead is zero and that other regulated contaminants such as trihalomethanes (THMs) and haloacetic acids (HAAs) pose health risks based on lifetime exposures, EPA's prioritization of non-lead national primary drinking water regulations over corrosion control must be critically reexamined.

elevated levels of lead to go unchecked, in an event that is now acknowledged to have caused lead poisoning in hundreds (and perhaps thousands) of children.[32]

We urge EPA to replace the LCR's existing compliance mechanism for corrosion control treatment with a mechanism that corresponds to lead levels at the tap and increases public health protection. A scheme that triggers a violation following a LCR lead action level exceedance would do just that. Should EPA leave this mechanism in place, it must provide peer-reviewed science showing that:

- → **Optimized water quality parameter levels (and for the specific narrow set of parameters the agency has proposed) are reliable predictors of lead-in-water levels at consumer taps; and**
- → **Water system maintenance of State-designated "optimal" water quality parameter ranges has prevented large-scale lead-in-water contamination in cities like Washington, DC; Flint, MI; Portland, OR; Newark, NJ; Pittsburgh, PA; and Sebring, OH.**

b. **Water quality parameters**: In its proposed revisions to the LCR, EPA suggests changing the list of target water quality parameters from:

- → pH
- → Alkalinity
- → Calcium
- → Conductivity
- → Orthophosphate (if the corrosion inhibitor was phosphate-based)
- → Silica (if the corrosion inhibitor was silicate-based)
- → Temperature

to

- → Lead
- → Copper
- → pH
- → Alkalinity
- → Orthophosphate (when an orthophosphate-based inhibitor is used)
- → Silicate (when a silicate-based inhibitor is used)

This revision eliminates calcium, conductivity, and temperature from the original list because research has shown that "calcium carbonate stabilization is ineffective at preventing corrosion in lead and copper pipes." Although this may very well be true, according to EPA lead corrosion expert Mike Schock, knowing calcium levels can still provide important information about the nature and condition of protective lead scales in lead service lines.[33] Same for temperature.

---

[32] Edwards, M., S. Triantafyllidou, and D. Best. 2009. Elevated Blood Lead in Young Children Due to Lead-Contaminated Drinking Water: Washington, DC, 2001-2004. *Environmental Science & Technology* 43:1618-1623; Edwards, M. 2014. Fetal Death and Reduced Birth Rates Associated with Exposure to Lead-Contaminated Drinking Water. *Environmental Science & Technology* 48:739-746.

[33] Personal communication, February 3, 2020.

EPA's revised list also continues to omit additional water quality parameters known to have potentially significant impacts on lead corrosion and lead release (e.g., chlorides, sulfates, manganese, iron, aluminum, and the formation/dissolution of protective scales in lead service lines).[34] This, despite the fact that, according to recent peer-reviewed studies, monitoring pH, alkalinity, orthophosphate, and silicate values alone would render impossible the development of meaningful estimations about something as basic as the existence and nature of protective lead scales in a water system's lead service lines.[35] In short, EPA's narrowed-down list can result in routine water system failures to identify and control water quality factors that play a significant role in inhibiting or exacerbating lead corrosion in different distribution systems. Given:

- → The available peer-reviewed science on associations between lead corrosion and water quality parameters beyond pH, alkalinity, orthophosphate, and silicate, and

- → The LCR's ultimate goal of providing "maximum human health protection by reducing the lead and copper levels at consumers' taps to as close to the MCLG [Maximum Contaminant Level Goal] as is feasible,"[36]

we urge EPA to expand the proposed water quality parameter list to *all* the factors known to significantly impact lead corrosion and lead release. Should EPA leave its proposed list unchanged, it must provide a scientifically defensible justification for the list's narrow scope.

c. **Water quality zones**: In light of the fact that within any given distribution system (small, medium, or large) water quality – and, thus, water corrosivity – in different geographical areas can vary significantly, the LCR's requirements for lead and copper monitoring at high-risk sites, optimized water quality parameters, and optimized corrosion control treatment must be revised to ensure that worst-case lead-in-water levels are indeed captured and that water quality parameters and corrosion control treatment are properly adjusted to address *actual* worst-case conditions. If the challenge of water quality zones is left unaddressed, assessments of lead release in any given system can be erroneous, "optimized" water quality parameters and corrosion control treatment can be sub-optimal, and water system assurances of safety can be deceiving. **Should EPA decide against addressing this problem, it must provide its rationale and the peer-reviewed science that supports it.**

---

[34] See, for example, Ng, D-Q. and Y-P. Lin. 2016. Effects of pH Value, Chloride and Sulfate Concentrations on Galvanic Corrosion Between Lead and Copper in Drinking Water. *Environmental Chemistry* 13(4):602-610; Ng, D-Q., C-Y. Chen, and Y-P. Lin. 2018. A New Scenario of Lead Contamination in Potable Water Distribution Systems: Galvanic Corrosion Between Lead and Stainless Steel. *Science of the Total Environment* 637-638:1423-1431; Stets, E. G., C. J. Lee, D. A. Lytle, and M. R. Schock. 2018. Increasing Chloride in Rivers of the Conterminous U.S. and Linkages to Potential Corrosivity and Lead Action Level Exceedances in Drinking Water. *Science of the Total Environment* 613-614:1498-1509.

[35] See, Schock, M. R., et al. 2014. Importance of Pipe Deposits to Lead and Copper Rule Compliance. Journal AWWA 106(7):E336-E349; Wasserstrom, L. W., et al. 2017. Scale Formation Under Blended Phosphate Treatment for a Utility with Lead Pipes. *Journal AWWA* 109(11):E464-E478; Tully, J., M. K. DeSantis, and M. R. Schock. 2019. Water quality–Pipe Deposit Relationships in Midwestern Lead Pipes. *AWWA Water Science* 1(2):e1127).

[36] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26478.

d. **Small and medium water system water quality monitoring**: Water quality parameter monitoring in small and medium water systems must occur routinely, must occur independently of any LCR lead trigger level or lead action level exceedance, and must include sampling at the same time as compliance monitoring for lead and copper. This scheme will yield data that is necessary for assessing the causes of a LCR lead action level exceedance, should such an exceedance occur. In the absence of consistent water quality monitoring – before, during, and after a LCR lead trigger level or lead action level exceedance – small and medium water systems have little capacity to conduct meaningful investigations of a contamination event and to develop scientifically sound responses.

e. **Large water system corrosion control re-optimization**: Under the current LCR, "optimized" corrosion control treatment for large water systems refers to treatment that achieves *the lowest possible levels of lead at consumer taps* without violating any other national primary drinking water regulation. According to EPA lead corrosion expert Mike Schock, to date, no large water system has conducted the corrosion control studies mandated by the Rule to identify optimized corrosion control treatment as intended.[37] Instead, for almost three decades, large water systems and their primacy agencies have deemed corrosion control treatment "optimized" simply when 90th percentile values have met the LCR lead action level, irrespective of the system's ability to achieve further systemwide lead-in-water reductions. This constitutes a gross misinterpretation of the LCR, which from a public health perspective becomes even more troubling when one considers that:

   → The mandated 1st-draw sampling protocol does not capture worst-case lead in lead service line homes, and
   → Many water systems with and without lead service lines have been using sampling protocols known to temporarily reduce lead-in-water levels at the tap and, thus, have been underestimating their 90th percentile value.

   If, under the revised LCR, a large water system exceeds the trigger level, it must be required to:

   → Conduct a comprehensive study of *all* the factors that contributed to the exceedance (not just the short list of water quality parameters in the current LCR);[38]
   → Implement optimized/re-optimized corrosion control treatment that results in the lowest possible 90th percentile value, *even if other water treatments must be adjusted*;[39]

---

[37] Personal communication, February 1, 2020.

[38] Peer-reviewed science shows that there are many more water quality factors that can affect lead corrosion and lead release than the ones in the proposed water quality parameter list (see, Schock, M. R., et al. 2014. Importance of Pipe Deposits to Lead and Copper Rule Compliance. *Journal AWWA* 106(7):E336-E349; Wasserstrom, L. W., et al. 2017. Scale Formation Under Blended Phosphate Treatment for a Utility With Lead Pipes. *Journal AWWA* 109(11):E464-E478; Tully, J., M. K. DeSantis, and M. R. Schock. 2019. Water quality–Pipe Deposit Relationships in Midwestern Lead Pipes. *AWWA Water Science* 1(2):e1127).

[39] In light of the fact that the Maximum Contaminant Level Goal (MCLG) for lead is zero and that other regulated contaminants such as trihalomethanes (THMs) and haloacetic acids (HAAs) pose health risks based on lifetime exposures, EPA's prioritization of non-lead national primary drinking water regulations over corrosion control must be critically reexamined.

→ Once the proper goal is achieved, set optimal water quality parameter ranges for *all* relevant parameters, as appropriate for the specific system, which would then be monitored on a regular basis.

f. **Source water or water chemistry changes**: The revised LCR must strictly prohibit changes to water source or water chemistry without a comprehensive and scientifically robust study of the impact of these changes on lead-in-water levels at the tap and the corrosion control treatment in place (if any).

g. **Corrosion control treatment decisions/assessments**: We recommend that the revised LCR require all decisions about and assessments of a water system's corrosion control treatment to be examined and certified by an independent, certified professional engineer with expertise in corrosion control. All documentation involved in this process must be publicly available.

5. LEAD SERVICE LINE INVENTORY

We applaud EPA for proposing complete and systematic inventories of the entire length of lead service lines and galvanized lines (in both public and private space) and agree with the justification offered for this requirement. **We recommend, however, that EPA strengthen two components of its proposal: inventory content and transparency.**

Specifically, we believe that under the revised LCR:

a. EPA, which has the appropriate technical expertise (as opposed to States that don't), must prescribe acceptable methods for verifying service line material.
b. Inventories must be required to include detailed information about:

→ The precise methods and resources used to make a determination about a service line's material(s) (e.g., plumbing codes, permits, different types of physical inspections);
→ **Plumbing materials along the *entire length* of a service line (e.g., lead pipe; galvanized pipe; and lead-bearing meters, compression fittings, goosenecks, pigtails, and connectors), from the water main to the service line, from the service line to the water meter, in the water meter, from the water meter to the exterior wall of the residence, from the exterior wall into the home**;
→ The dates when these materials were confirmed; and
→ The health risks associated with lead service lines (and galvanized lines currently or formerly downstream of a lead service line) as well as the potential health risks of service lines labeled as "unknown."

Without this information, it is almost impossible for customers to assess the accuracy, trustworthiness, and completeness of inventories or make meaningful use of them for their own health protection.

c. Water systems with existing inventories currently indicating a service line to be "free of lead" in the absence of complete and thorough investigations (e.g., simply because the exposed portion of the service line inside a house was determined to be copper or the portion of the

lead service line in public space was replaced) must be required to re-label this line as "unknown" until all its components are properly identified.

d. Water systems must be required to make public the specific addresses of homes with a confirmed lead service line, galvanized line, or service line of unknown material as well as mark those addresses that correspond to schools and childcare facilities. Given the LCR's "shared responsibility" regime, this information is crucially important for the following reasons:

   → It helps water users better assess the risks of tap water in homes and buildings that may not be their own but that they frequent, and to alert residents at these homes (who might be family members, friends, or neighbors) and/or school/childcare facility managers/owners about a plumbing hazard they may be unaware of;
   → It allows future tenants and homebuyers to make informed decisions about potential plumbing hazards in the buildings they choose to consider for rent/purchase; and
   → It helps customers ensure that their water system's lead-in-water monitoring program does, indeed, target the number of lead service line homes it is supposed to target; and when a water system has difficulty identifying enough lead service line homes for regulatory compliance sampling, it enables customers to help with recruitment.

   Most importantly, the fact that lead service lines and galvanized lines *pose a known and significant public health hazard* makes it difficult to justify a water system's failure to disclose their precise location when this location is known. Such intentional non-disclosure seems antithetical to – if not in direct violation of – the Safe Drinking Water Act (SDWA).

e. All water systems (small, medium, and large) that have a website must be required to post their inventory online.

6. LEAD SERVICE LINE REPLACEMENT

Today we know that lead service lines and partially replaced lead service lines pose a serious and permanent risk to human health, whether or not:

a. A water system meets the LCR lead action level, or
b. A one-time test of water sitting in a lead service line (or a partially replaced lead service line) reveals non-detect or low lead-in-water levels.

Few would dispute that when it comes to lead in water, full removal of lead service lines would constitute one of the most public-health-protective actions. It would also result in significant long-term cost and environmental benefits since the dose of phosphate-based corrosion control inhibitor required would be far lower than if lead service lines remained in service. This conclusion seems more obvious

and pressing today than in the past, as scientific understanding about the risks of both intact and partially replaced lead service lines has only increased.[40] It is, therefore, imperative that the revised LCR:

a. *Bans partial lead service line replacement* once and for all (with the possible exception of emergency repairs, though such repairs must be followed promptly with full lead service line replacement), as supported by current science as well as the Centers for Disease Control and Prevention (CDC) and the American Academy of Pediatrics (AAP);[41] and

b. *Mandates enforceable and proactive full lead service line replacement* that is:
   - → Funded fully by water systems; [42]
   - → Implemented at a rate of at least 10% per year, irrespective of a water system's 90th percentile value, lead trigger level status, or lead action level status;
   - → Completed in no longer than ten years;
   - → Coupled with the provision of lead-certified filters; and
   - → Accompanied by the delivery of scientifically accurate information, disclosing the likelihood of ongoing short- and long-term lead-in-water contamination from:
     - Internal plumbing that can "absorb" lead from lead service lines and can release it in the future, and/or
     - Other lead-bearing plumbing materials, such as lead solder and leaded brasses.

Although we appreciate that in its proposed revisions, EPA takes the long overdue step of promoting full lead service line replacement and prohibiting the current Rule's scientifically unsupportable "test-outs,"[43] we are concerned that the agency still grants water systems room to delay full lead service line

---

[40] See, for example, Brown, M. J. 2011. Association Between Children's Blood Lead Levels, Lead Service Lines, and Water Disinfection, Washington, DC, 1998–2006. *Environmental Research* 111:67-74; Slabaugh, R. 2014. Optimized Corrosion Control—An Estimate of National Impact (Power Point presentation). AWWA Water Quality Technology Conference (WQTC), New Orleans, LA, Nov. 16-20; Slabaugh, R., et al. 2015. National Cost Implications of Potential Long-Term LCR Requirements. *Journal AWWA* 107(8):E389-E400.

[41] Britton, A. and Richards, W.N. 1981. Factors Influencing Plumbosolvency in Scotland. *Journal of the Institute for Water Engineers and Scientists* 35(5):349-364; Cartier, C. et al. 2013. Impact of Treatment on Pb Release from Full and Partially Replaced Harvested Lead Service Lines (LSLs). *Water Research* 47(2):661-71; Cartier, C. et al. 2012. Effect of Flow Rate and Lead/Copper Pipe Sequence on Lead Release from Service Lines. *Water Research* 46(13): 4142-52; St. Clair, J. et al. 2013. Long-term Behavior of Partially Replaced Lead Service Lines. Oral Presentation at CaNv-AWWA 2013 Inorganic Contaminants Symposium. Sacramento, CA; Hu, J. et al. 2012. Copper-Induced Metal Release from Lead Pipe into Drinking Water *Corrosion* 68(11):1037-1048; Wang, Y. et al. 2013. Effect of Connection Methods on Lead Release from Galvanic Corrosion. *JAWWA* 105(7): E337-E351; Triantafyllidou, S. and M. Edwards. 2011. Galvanic Corrosion after Simulated Small-Scale Partial Lead Service Line Replacements. *JAWWA* 103(9):85-99; Centers for Disease Control and Prevention (CDC) Letter to the EPA Office of Ground Water and Drinking Water, January 19, 2011; American Academy of Pediatrics Letter to the EPA Science Advisory Board Drinking Water Committee, March 22, 2011.

[42] See, Earthjustice. 2014. Lead and Copper Rule Long-Term Revisions: Issues Regarding Lead Service Line Replacement [11/11 Letter to EPA Office of Groundwater and Drinking Water]; Goho, S. A., M. Saenz, and T. Neltner. 2019. Rates Could Fund Lead Pipe Replacement in Critical States: Laws in States with the Most Lead Service Lines Support the Practice; and examples of cities such as Flint, MI; Lansing, MI, and Madison, WI.

[43] The LCR's "test-out" provision allows water systems with lead service lines that exceed the LCR lead action level to count as "replaced" lead service lines whose water was sampled for lead and measured ≤15 mg/L.

replacement for decades, and in many cases indefinitely, as well as to continue to conduct partial lead service line replacements.

Regulations without enforcement are little more than suggestions. Therefore, for many water systems with lead service lines (or service lines of unknown material), EPA's proposed full lead service line replacement requirement seems like little more than a (taxing and dreaded) suggestion. By contrast, we believe that the proposed requirement for all water systems with lead service lines (or service lines of unknown material) to develop a *full lead service line replacement plan* – that may be executed anemically or never be implemented – ought to be used as an opportunity to mandate the development of a *full lead service line replacement plan with an enforceable timeline*. Michigan's State-specific LCR does just that and ought to be used as a model.

Against this backdrop, we offer the following more specific recommendations:

a. **Legal authority for lead service line replacement in private space**: All water systems with lead service lines (and/or service lines of unknown material) must be required to make transparent and easily accessible *independently verified information* about their legal authority to carry out replacement of plumbing materials (or hazardous plumbing materials) in private space.

b. **Collaboration with consumers**: All water systems with lead service lines (and/or service lines of unknown material) must be required to design and implement their full lead service line replacement programs *in collaboration* with community member advisory teams that reflect their community's diversity. If done properly, this collaboration would increase the effectiveness of the programs; enable water systems, State agencies, and EPA to abide by and promote the environmental justice principles of fair treatment and meaningful involvement; and support the just implementation of the LCR's "shared responsibility" regime.

c. **Medium and large water system goal-based full lead service line replacement following lead trigger level exceedances**: Medium and large water systems with lead service lines (and/or service lines of unknown material) must be required to implement full lead service line replacement programs that comply with basic *EPA-prescribed* standards and goals for *actual* lead service line replacement. These standards and goals *must be enforceable*. EPA's proposal that water systems exceeding the lead trigger level be left on their own to implement full lead service line replacement with a self-set goal (to be approved by the State), leaves room for:

   → Significant variation in lead service line replacement programs (e.g., one water system might decide to replace all its lead service lines in ten years, while another in 80 years or never) and, therefore, uneven public health protection from water system to water system; and

   → Systematic perpetuation of environmental injustice, given EPA's recommendation that water systems develop their programs on the basis of several factors, including "*the financial circumstances of the water system and its customers*."[44] (emphasis added)

[44] Active research at American University in Washington, DC is looking precisely at "whether Washington, DC's voluntary (cost-share) approach to financing lead service line (LSL) replacement results in lower levels of replacement among low-income and minority residents."

Additionally, EPA's proposal that water systems be deemed in violation of the LCR *not* when they fail to meet their self-set goal, but when they fail to conduct some form of loosely prescribed public outreach activity aimed at getting homeowners to participate in their full lead service line replacement program, is inappropriate from both a regulatory and an environmental justice standpoint. Such an arrangement would:

→ Allow water systems to practically abdicate their responsibility to protect consumers from lead-service-line lead by transferring part, if not all, of the burden of full lead service line replacement to consumers; and it would give them more leeway to blame consumers for programs that don't go as imagined.[45]

→ Not hold water systems accountable for:

- Full lead service line replacement programs that might be financially difficult or impossible for all consumers to take part in;
- Public outreach activities that might consistently fail to reach all consumers; and
- Public outreach activities that might routinely leave at least some consumers confused or overwhelmed.

→ Ignore that lead service lines were rarely chosen by consumers and, in the case of many jurisdictions, were mandated by law. Municipal codes requiring the use of lead service lines were commonplace, starting in the mid-1800s.[46] Chicago, for example, the city with the largest known concentration of these lines, mandated their installation until 1986 (i.e., the year of the Safe Drinking Water Act (SDWA) amendments that banned lead plumbing materials). In jurisdictions with plumbing codes requiring the use of lead service lines, homeowners could not request alternative materials, even if they were aware of and concerned about lead's toxicity.[47] In *The Great Lead Water Pipe Disaster* (2008), professor of economics Werner Troesken explains that erroneous understandings about the safety of lead service lines were widespread not only among plumbers, but also among several groups of trusted professionals, including public officials and medical experts. Yet these understandings were often used to "educate" consumers and even dispel public fears about lead in plumbing. This history raises serious moral and environmental justice questions about perpetuating a lead-in-water regulation that places partial (if not at times full) responsibility on consumers for eliminating this hazard.

In short, water utility "effort to reach out" to consumers is not an appropriate, meaningfully measurable, or public health protective regulatory requirement. If implemented, it will make space for long-term and even indefinite delays of full lead service line replacement in systems exceeding the LCR trigger level but meeting the LCR lead action level. In fact, it is bound to make such delays highly likely.

---

[45] The water utility industry's culture of condescension and disrespect toward the public was discussed in the October 28, 2015 recommendations of National Drinking Water Advisory Council (NDWAC) LCR work group dissenting member Yanna Lambrinidou, PhD.

[46] Toesken, W. 2008. The Great Lead Water Pipe Disaster. Cambridge, MA: MIT Press.

[47] Rabin, R. 2008. The Lead Industry and Lead Water Pipes: "A Modest Campaign." *American Journal of Public Health* 98(9):1584-1592.

d. **Medium and large water system mandatory full lead service line replacement following lead action level exceedances**: Medium and large water systems with lead service lines (and/or service lines of unknown material) that exceed the LCR lead action level must be required to implement full lead service line replacement at an annual rate of at least 10% of their total number of inventoried lead service lines and service lines of unknown material (the current requirement is 7% per year). EPA's proposal to reduce this rate to 3% will cause significant – if not indefinite – delays in the full replacement of lead service lines. Moreover, it raises serious environmental justice concerns, as well as concerns about regulatory backsliding.

The agency's argument that a reduced rate of replacement (from 7% to 3%) does not weaken the Rule's lead service line replacement requirement is based on the rationale that the revised LCR will no longer permit partial lead service line replacement or "test-outs" for regulatory compliance (and will, therefore, increase the rate of full lead service line replacement). Although this would constitute a definite improvement over the current Rule, it would be *far* from a "gift" to consumers that must be "paid" for with a lowered required rate of full lead service line replacement. **We contend that the large-scale risk and harm that partial lead service line replacement and the "test-out" provision have imposed on consumers over the past two+ decades amounts to a policy-driven environmental injustice and must be placed *at the center* of EPA's rate-replacement calculations.**

Specifically:

→ EPA has known about the health protective value of full lead service line replacement and about the risks of partial lead service line replacement since at least the promulgation of the LCR.[48] Indeed, prior to a 1994 lawsuit by the water utility industry group American Water Works Association (AWWA), the LCR mandated full lead service line replacement at an annual 7% rate.[49] Moreover, the peer-reviewed scientific literature on short- and long-term spikes following partial lead service line replacement

[48] See the case the Agency makes for full replacement in the Rule's preamble.

[49] For more information see, Stecker, T. 2016. Federal Law Makes Lead-Pipe Removal Anything but a Cinch. *E&E News* (7/7): "Paying for a homeowner's private line replacement won't benefit public health, said Steve Via, director of federal relations for the American Water Works Association (AWWA), a trade group. 'You're benefiting the owner of that property, you're not benefiting the public,' he said. […] In 1994, AWWA sued EPA over this 'control' approach. The U.S. Court of Appeals for the District of Columbia Circuit struck down the definition on technical grounds. Six year later, EPA revised the Lead and Copper Rule to put the cost on property owners."

is extensive and growing.[50] Additionally, a decade-old Centers for Disease Control and Prevent (CDC) study found that children in a home with a partially replaced lead service line are twice as likely to have elevated blood lead levels as children in a home with an intact lead service line, and four times as likely as children in a home with no lead pipe.[51] And, according to EPA, a 2004 Black and Veatch water system survey reported that 72% of LCR-mandated lead service line replacements resulted in partial replacements.[52] **It is difficult not to see that the LCR's "remedial" partial lead service line replacement requirement, which has been presented to communities across the country as "protective" of public health has actually placed thousands of consumers at increased risk of exposure to lead and has, in all likelihood, caused large-scale, undetected, unaddressed, and irreversible public health harm.**

→ Similarly, the LCR's "test-out" provision flies in the face of both the LCR's Maximum Contaminant Level Goal (MCLG) *and* scientific knowledge that lead release from plumbing tends to be highly variable. Moreover, it has left hundreds, if not thousands, of consumers with the false assurance that their water is safe and that their lead service line does not need replaced. Yet it has enabled many water systems exceeding the LCR lead action level to meet regulatory requirements while saving money. In its proposed revisions, EPA states that "due to the cost savings of test-outs over LSLR [lead service line replacement], […] 25 percent of CWSs [community water systems] serving more than 10,000 people would take an LSL [lead service line] sample before replacing the LSL [lead service line], and that 80 percent of LSLs [lead service lines] would meet the test-out criteria." **Eliminating from the Rule the unscientific and morally unconscionable "test-out" provision is *necessary and urgent* for curbing the large-scale public health risk this provision has created and the highly likely public health harm it has caused.**

→ To make matters worse, if left unchanged, the current 1st-draw-only compliance sampling protocol will continue to delay full lead service line replacement in 54-70% of water systems with lead service lines (delivering water to approximately 74-96 million

---

[50] Britton, A. and Richards, W.N. 1981. Factors Influencing Plumbosolvency in Scotland. *Journal of the Institute for Water Engineers and Scientists* 35(5):349-364; Cartier, C. et al. 2013. Impact of Treatment on Pb Release from Full and Partially Replaced Harvested Lead Service Lines (LSLs). *Water Research* 47(2):661-71; Cartier, C. et al. 2012. Effect of Flow Rate and Lead/Copper Pipe Sequence on Lead Release from Service Lines. *Water Research* 46(13): 4142-52; St. Clair, J. et al. 2013. Long-term Behavior of Partially Replaced Lead Service Lines. Oral Presentation at CaNv-AWWA 2013 Inorganic Contaminants Symposium. Sacramento, CA; Hu, J. et al. 2012. Copper-Induced Metal Release from Lead Pipe into Drinking Water *Corrosion* 68(11):1037-1048; Wang, Y. et al. 2013. Effect of Connection Methods on Lead Release from Galvanic Corrosion. *JAWWA* 105(7): E337-E351; Triantafyllidou, S. and M. Edwards. 2011. Galvanic Corrosion after Simulated Small-Scale Partial Lead Service Line Replacements. *JAWWA* 103(9):85-99; Centers for Disease Control and Prevention (CDC) Letter to the EPA Office of Ground Water and Drinking Water, January 19, 2011; American Academy of Pediatrics Letter to the EPA Science Advisory Board Drinking Water Committee, March 22, 2011.

[51] Brown, M. J. 2011. Association Between Children's Blood Lead Levels, Lead Service Lines, and Water Disinfection, Washington, DC, 1998–2006. *Environmental Research* 111:67-74.

[52] US Environmental Protection Agency. 2004. U.S. EPA Lead Service Line Replacement Workshop Summary Report.

people), which *should* have exceeded the LCR lead action level and *should* have been required to conduct mandatory lead service line replacement a long time ago.[53]

In short, we urge EPA not only to adopt a 1st- *and* 2nd-draw sampling protocol for water systems with lead service lines (and service lines of unknown material),[54] but also to *increase* the required rate of lead service line replacement to 10% annually, so that the nation's lead service lines are fully removed *in the near future* and the LCR's public health protective purpose is better realized.

e. **We also recommend that the revised LCR require**:

→ **All water systems with lead service lines (and/or service lines of unknown material) to conduct full lead service line replacement in the course of *any* planned infrastructure work, irrespective of service line ownership.**[55] As EPA reports in its proposal, "Madison, WI stated in its Federalism letter to the EPA that it 'achieved cost-saving efficiencies through effective planning that concentrated capital improvement projects in the lead service area. Lead service replacement costs never exceeded 20% of our annual capital budget. In addition, the compressed schedule and coordination with local plumbing contractors led to reduced mobilization costs.'" Public notification must be delivered *before* the day of the project, informing consumers that a replacement must be carried out. Consumer outreach must also include:

- Complete and accurate information about the risks of short- and long-term lead-in-water spikes following the replacement, and
- Lead-certified filters with clear disclosure that in some cases lead-in-water contamination might continue for months and years, until all internal lead-bearing plumbing is replaced.

→ **All water systems to conduct replacement of lead-bearing meters, compression fittings, goosenecks, pigtails, and connectors in the course of *any* planned infrastructure work irrespective of *who owns* these plumbing materials**.[56] Notification to consumers must be delivered *before* the day of the project, informing them that a replacement is possible; if lead-bearing plumbing is detected, notification must be delivered again *before* the actual replacement (not within 24 hours after the replacement). Consumer outreach must include:

---

[53] Slabaugh, R. 2014. Optimized Corrosion Control—An Estimate of National Impact (Power Point presentation). AWWA Water Quality Technology Conference (WQTC), New Orleans, LA, Nov. 16-20.

[54] Michigan's State-specific LCR, for example, requires a 5th-liter compliance sample for all homes with a lead service line.

[55] See, Earthjustice. 2014. Lead and Copper Rule Long-Term Revisions: Issues Regarding Lead Service Line Replacement [11/11 Letter to EPA Office of Groundwater and Drinking Water].

[56] See, Earthjustice. 2014. Lead and Copper Rule Long-Term Revisions: Issues Regarding Lead Service Line Replacement [11/11 Letter to EPA Office of Groundwater and Drinking Water].

- Complete and accurate information about the risks of short- and long-term lead-in-water spikes following the replacement, and

- Lead-certified filters with clear disclosure that in some cases lead-in-water contamination might continue for months and years, until all internal lead-bearing plumbing is replaced.

→ **All water systems to replace lead-bearing meters, compression fittings, goosenecks, pigtails, and connectors in the course of *any* emergency infrastructure work irrespective of *who owns* these plumbing materials**.[57] Notification must be delivered to consumers *immediately before* and *immediately after* the actual replacement (not within 24 hours after the replacement). Consumer outreach must include:

- Complete and accurate information about the risks of short- and long-term lead-in-water spikes following the replacement, and

- Lead-certified filters with clear disclosure that in some cases lead-in-water contamination might continue for months and years, until all lead-bearing plumbing in the house is replaced.

→ **All water systems to include in all public messaging a disclosure about the short- and long-term health risks associated with physical disturbances of *all* lead-bearing plumbing** (not just lead service lines), irrespective of *who* caused the physical disturbance (e.g., the water system, a different public utility, construction in the neighborhood, heavy traffic, etc.).

f. **Finally, we urge EPA to provide the scientific basis for the following proposals**:

→ A *single* mandatory lead-in-water tap sample between 3-6 months after a partial lead service line replacement, a full lead service line replacement, or a replacement of lead-bearing meters, compression fittings, goosenecks, pigtails, and/or connectors. What scientific meaning does EPA see in such a sample?

→ Consumer notification about the post-replacement result of a *single* mandatory lead-in-water sample:

- Within 30 days, if the sample measures ≤15 mg/L, and
- Within 24 hours, if the sample measures >15 mg/L.

How does this two-track system of communication take into account the well-documented variability in lead release?

→ The statement that *three months* is "the expected timeframe for lead levels to decrease following a lead service line replacement," and the proposed mandatory provision of a *three-month* supply of filters and/or filter replacement cartridges following partial lead service line replacement, full lead service line replacement, and replacement of lead-

[57] See, Earthjustice. 2014. Lead and Copper Rule Long-Term Revisions: Issues Regarding Lead Service Line Replacement [11/11 Letter to EPA Office of Groundwater and Drinking Water].

bearing meters, compression fittings, goosenecks, pigtails, and connectors. This question also pertains to the agency's proposal to *not* require water systems to replace the portion of a lead service line in public space after they learn that a customer replaced the portion of the line in private space over *three months* earlier. How does EPA take into account peer-reviewed science showing lead-in-water elevations for months and years after partial lead service line replacement and persistent contamination after full lead service line replacement?[58]

7. Compliance Alternatives for a Lead Action Level Exceedance for Small Community Water Systems

The flexibilities EPA proposes to grant to small water systems in order to help them maintain regulatory compliance following a LCR lead action level exceedance raise serious questions about the agency's a) scientific rationale, b) perpetuation of a well-documented and widespread environmental injustice that has allowed small water systems to routinely deliver unsafe drinking water to millions of water users,[59] and c) potential regulatory backsliding. We urge EPA to revise its proposed flexibility offerings in at least three ways. Should the agency leave its proposal unchanged, it must disclose the peer-reviewed science and the environmental justice principles that justify these flexibilities.

EPA argues that regulatory flexibility for small water systems is necessary *not for any public-health-related reason*, but for the fact that small water systems tend to be significantly under-resourced. The agency further explains that, as a result, these systems often:

> *"face challenges in reliably providing safe drinking water to their customers and consistently meeting the requirements of the SDWA and the National Primary Drinking Water Regulations (NPDWRs). These challenges include, but are not limited to: (1) Lack of adequate revenue or access to financing; (2) aging infrastructure; (3) retirement of experienced system operators and the inability to recruit new operators to replace them; (4) managers and operators who lack the requisite financial, technical or managerial skills; (5) lack of planning for infrastructure upgrades or the ability to respond to and recover from natural disasters (e.g., floods or tornadoes); and (6) lack of understanding of existing or new regulatory requirements and treatment technologies. As a result, some small systems may experience frequent or long-term compliance challenges in reliably providing safe water to their customers while others may be in compliance now but lack the technical capacity to maintain compliance (OIG, 2006)."*

EPA proceeds to present the challenge of small water systems as one of being able to meet LCR requirements despite serious resource limitations, rather than of being able to amass the funding, experience, and expertise needed to address LCR lead action level exceedances comprehensively, through a *strengthened* version of the current LCR's multi-pronged approach (i.e., source water

---

[58] For example, Del Toral, M. A. et al. 2013. Detection and Evaluation of Elevated Lead Release from Service Lines: A Field Study. *Environmental Science & Technology* 47(16): 9300–9307; McFadden, M., et al. 2011. Contributions to Drinking Water Lead from Galvanized Iron Corrosion Scales. *Journal AWWA* 103(4):76-89.

[59] Laura Ungar, L. and M. Nichols. 2016. 4 Million Americans Could Be Drinking Toxic Water and Would Never Know. *USA Today* (12/13); Philip, A., et al. 2017. 63 Million Americans Exposed to Unsafe Drinking Water. *USA Today* (8/14); Fedinick, K. P., S. Taylor, and M. Roberts. 2019. Watered Down Justice [a report by NRDC, Coming Clean, and Environmental Justice Health Alliance].

monitoring, implementation or optimization/re-optimization of corrosion control treatment, public education, and partial lead service line replacement).

Proposing to abandon the current LCR requirement for *all* small water systems that exceed the LCR lead action level – namely, *implementation and maintenance of corrosion control treatment* – EPA suggests a "compliance alternative" that would include three separate "remedial" options and would allow small water systems to choose only one: full lead service line replacement, implementation and maintenance of optimized corrosion control treatment, or installation and maintenance of POU filter devices.

Arguing that EPA's proposed flexibility must be significantly curbed, we summarize the comments we made in section 3 (Lead Trigger Level) above. Small water systems with lead service lines (and/or service lines of unknown material) that exceed the LCR lead action level must:

a. Not be allowed to conduct full lead service line replacement *without* corrosion control treatment implementation/optimization, unless they can show that lead-in-water levels at highest-risk homes *with no lead service lines* fall consistently below the LCR lead action level. Should EPA leave its proposal unchanged, it must disclose the peer-reviewed science that justifies from a public health perspective this specific flexibility.

b. Not be allowed to implement corrosion control treatment *without* conducting simultaneous full lead service line replacement. Should EPA leave its proposal unchanged, it must disclose the peer-reviewed science that justifies from a public health perspective this specific flexibility.

c. Not be allowed to select the POU filter option *without* full lead service line replacement. Should EPA leave this flexibility unchanged, it must provide an explanation about how it aligns with environmental justice principles.

8. PUBLIC EDUCATION

In light of the fact that there is *no safe level* of lead in water and that the LCR allows for:

a. 100% of homes sampled for LCR compliance to dispense any concentration of lead between 1-15 mg/L at the time of sampling, and
b. 10% of homes sampled for LCR compliance to dispense *any* concentration of lead whatsoever at the time of sampling,

the Rule's compliance mechanism guarantees no individual consumer protection from chronic or acute exposures to lead at the tap. In other words, under the LCR, consumers who want to be sure that the water they use to drink and cook does not place them at health risk are on their own to take precautionary measures. This means that public education about lead in water and the limitations of the LCR – including the limitations of tap monitoring and corrosion control treatment – is *vital* for proper consumer action and, ultimately, for effective public health protection.

Although EPA's proposal for a revised public education requirement includes some notable improvements, it continues to be based on a fundamentally flawed premise – that frequent, robust, multi-media, and systemwide public education about lead in water is needed primarily when a water

system exceeds the LCR lead action level and contamination is severe and widespread. In EPA's own words:

> *"The purpose of public education is to inform consumers that the water system has exceeded the action level, provide information about the health effects of lead, the sources of lead in drinking water, actions consumers can take to reduce exposure, and explain why there are elevated levels of lead and actions the water system is taking."*

Despite public calls for significant changes to the LCR's public education requirement that take into account consumers' *constant* vulnerability to lead-in-water exposures, the Rule's "shared responsibility" regime, and the urgent need for public messaging that stresses the importance of adopting precautionary water use practices that minimize lead exposures *in all buildings* and *at all times, even when water systems meet LCR requirements*,[60] EPA's proposal leaves the essence of the Rule's public education requirement largely unchanged. For example, should the agency's proposed revisions be adopted:

a. **Consumers in water systems that do *not* exceed the LCR lead action level may *never* receive notification about the prevalence of lead in water and the associated health risks, which seems to stand in direct opposition to the Safe Drinking Water Act's (SDWA's) Public Notification Rule**.

b. **Large-scale public education about lead in water will be limited to annual messaging, mostly – if not exclusively – in the form of written, unidirectional, and at least in some cases abstruse and incomplete communication**: Such outreach would not meet consumer-centered risk communication best practices[61] and would risk failing to give consumers the sense of risk and urgency that the problem demands. Intensified public messaging using additional channels of communication would be reserved for events of regulatory significance (e.g., LCR lead action level exceedances, water system failures to meet lead service line replacement goals following a lead trigger level exceedance), which will not always correspond to a higher-than-normal risk of lead exposure for individual consumers.

c. **Notification of contamination will continue to be triggered by test result thresholds that have meaning for corrosion control purposes but not for public health**: We certainly appreciate EPA's recommendation to require systemwide customer notification of a LCR lead action level exceedance within 24 hours of learning of the exceedance,[62] and individual customer notification of a lead-in-water sampling result >15 mg/L within 24 hours of learning of the result. This notification scheme, however, seems to presuppose that systemwide customer notification about the risks of lead in water in *all buildings* with lead-bearing plumbing and the need for

---

[60] See, for example, the October 28, 2015 recommendations of National Drinking Water Advisory Council (NDWAC) LCR work group dissenting member Yanna Lambrinidou, PhD; November 17, 2015 recommendations of the Northeast-Midwest Institute; and January 15, 2016 comments of Earthjustice on behalf of a national coalition of individuals and organizations.

[61] See the October 28, 2015 recommendations of National Drinking Water Advisory Council (NDWAC) LCR work group dissenting member Yanna Lambrinidou, PhD and The EPA's Seven Cardinal Rules of Risk Communication.

[62] EPA must require the same for lead trigger level exceedances or provide peer-reviewed science to justify non-disclosure of such exceedances to all consumers in affected service areas.

precautionary measures *at all times* is unnecessary when the LCR lead action level is met or when individual customers' lead-in-water sampling results measure <15 ppb. In reality:

- → Taps in buildings *with and without* lead service lines can dispense lead in the tens, hundreds, and even thousands of parts per billion, even when a water system meets the LCR lead action level; and
- → Individual consumers in homes *with and without* lead service lines can be routinely exposed to lead-in-water levels in the tens, hundreds, and even thousands of parts per billion, even when a one-time 1st-draw sample measures <15 ppb.

Almost 30 years after the LCR's promulgation, EPA must finally mandate a revised public education requirement that:

- → **Acknowledges the prevalence of lead in water and the arbitrariness – from a public health standpoint – of the lead action level and the proposed lead trigger level, and**
- → **Delivers *ongoing*, *proactive*, *public-health-focused* (rather than reactive, crisis-focused) public education, which does not downplay the risks, is accessible, and appears in multiple languages and media (e.g., online, via text messaging, broadcast media, and postings at public locations).**

d. **Annual Consumer Confidence Reports continue to be employed as effective vehicles of public education, despite studies documenting their severe limitations and research on consumer-centered risk communication suggesting they are outdated**:[63] Although we applaud EPA for its decision to recommend mandatory disclosure in Consumer Confidence Reports of the range of compliance sampling results as well as the number of samples >15 mg/L for each monitoring period, we urge the agency to also require disclosure of:

- → All compliance results,
- → Full addresses of the homes sampled, and
- → Service line material at each home.

This level of transparency is essential for a "shared responsibility" regulation. We are also concerned that in the absence of:

- → Multiple and diverse channels of communication, and
- → Consumer-friendly explanations about *how* the LCR works and *what* the various numbers and statistics mean,

information in Consumer Confidence Reports is unlikely to reach most water users and will be difficult for those it does reach to comprehend.[64] EPA's own effective risk communication guidelines stress that public messaging must explain clearly "the situation, the risks, and the

---

[63] See the October 28, 2015 recommendations of National Drinking Water Advisory Council (NDWAC) LCR work group dissenting member Yanna Lambrinidou, PhD.

[64] As more consumers have their water bills paid automatically, they are probably less likely to read regular mail from their water system. Moreover, as more water systems mail only a one-page version of their Consumer Confidence Report and leave it to consumers to access the full version online, the number of consumers who will actually read their Consumer Confidence Report is likely to drop further.

remedies." To this end, Consumer Confidence Reports must state clearly what the likelihood of lead in a consumer's water is, even when the water system is in compliance with the LCR lead action level; what water users can do to protect themselves from exposures; what a one-time 1st-draw sample reveals and does not reveal; and why precautions in homes with pregnant women, infants, and young children are important at all times. Consumer Confidence Reports must also provide accessible interpretations of the table that features regulatory compliance data, including the meanings and definitions of acronyms like "ppb," "MCLG," "LAL," and "90th percentile." When readers lack this information, they are unable to make sense of the data provided and to assess:

- → The significance of 90th percentile values above or below the LCR lead action level, as well as
- → What potential health risks they might personally face.

Although an improvement over the health language currently required in Consumer Confidence Reports, EPA's revised mandatory health language is sorely incomplete and raises longstanding concerns about the ability of the Rule's public education requirement to increase consumer awareness and foster informed consumer decision-making: EPA's proposed language is marred with omissions – for example, it makes no mention of the association of lead in water and miscarriage/fetal death, the prevalence and acute health risk of lead particles, the unpredictable and erratic nature of lead release and the limited meaning of lead-in-water test results, the health risk of *all* lead-bearing plumbing (including "lead free" devices manufactured after January 2014), the half-life of lead in blood and the challenge of catching exposures through routine blood lead screening, the inability of the LCR to protect individual consumers from chronic and acute exposures to lead at the tap, and the need for adoption of precautionary water use practices *at all times*.

Unfortunately, incomplete and misleading – if not inaccurate – public messaging about lead in water has been the rule rather than the exception in LCR-related public education and notification requirements. We raised these same concerns in Section 1 (General Information) and Section 2 (Background) above regarding EPA's statements about the LCR's effectiveness and estimates of drinking water contributions to total lead intake. In fact, we raise these same concerns about the scientific basis of EPA's proposed revisions in sections throughout our comments.

Complete, accurate, and scientifically substantiated information about lead in water is *necessary* for the LCR to work as intended. If such information is lacking, EPA's entire Rule, including its proposed outreach programs to the public (consumers, occupants, homeowners, health care professionals, State and local health agencies) can spread misinformation and do more harm than good.

As part of its responsibility to be transparent, we ask EPA to disclose the names of the risk communication experts it consulted to revise the mandatory health effects language. As part of its responsibility to promote consumer awareness and health-protective action, we urge EPA to collaborate with lead corrosion experts who have a demonstrated record of prioritizing public health, as well as affected members of diverse marginalized communities and grassroots clean water and environmental justice groups who have first-hand experience with lead in water in homes, schools, and childcare facilities, in order to ensure that the LCR's public education messaging is complete, accessible, and effective. Our recommendation applies to

EPA's proposed notification about lead service lines as well, which must be far more frequent than proposed and must communicate a sense of urgency, whether a water system meets the trigger/action level or not.[65]

e. **Notification requirements about copper-in-water exceedances continue to be *completely* absent**: As we state in Section 9 (Monitoring Requirements for Lead and Copper in Tap Sampling), EPA's proposed revisions would leave worst-case copper levels routinely undetected. This suggests that if copper-in-water measurements exceed the copper action level – *which is health-based* – through sampling in low-risk homes, contamination in high-risk homes is likely far more severe than the measurements reveal, potentially placing consumers at extremely serious health risk. It is, therefore, imperative that emergency notification requirements for copper are developed and included in the revised Rule.

Should EPA leave its proposal unchanged, it must a) cite risk communication research that justifies the public education scheme outlined, showing its potential to succeed in reaching consumers and fostering informed and health-protective decision-making, b) address studies identifying significant deficiencies in Consumer Confidence Report effectiveness, c) provide data on the percent of consumers who read the lead and copper section of their Consumer Confidence Report and who have adopted precautionary water use practices as a result of information in this Report, and d) explain how the Rule's complete absence of public education/notification requirements following copper action level exceedances complies with the Safe Drinking Water Act's (SDWA's) Public Notification Rule.

9. Monitoring Requirements for Lead and Copper in Tap Sampling

The LCR requires water systems to reduce consumers' exposure to lead in drinking water "to the lowest levels feasible."[66] The main vehicle through which the rule ensures that this goal is achieved is "comprehensive tap sampling at homes specifically targeted for their potential to contain elevated levels of lead […]."[67] In other words, the LCR's lead-in-water monitoring requirement is intended to capture worst-case lead-in-water levels in highest-risk homes.[68] This type of sampling aims at confirming that in

[65] For example, occupants of homes with lead service lines are entitled to know that a) their water system does not sample lead service line water and that, if it did, it would likely exceed the LCR lead action level and have to take emergency systemwide remedial actions, and b) lead-in-water spikes can occur any time lead service lines (or other lead-bearing plumbing) are disturbed, not only when these disturbances are caused by water system work. Also see the October 28, 2015 recommendations regarding lead service lines of National Drinking Water Advisory Council (NDWAC) LCR work group dissenting member Yanna Lambrinidou, PhD.

[66] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26477.

[67] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26514.

[68] The LCR states clearly that, "Targeting monitoring to worst-case conditions will help systems and States evaluate the reductions in contaminant levels achieved through treatment and determine when 'optimal' treatment is being maintained to the degree most protective of public health" (Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals (MCLGs) and National Primary Drinking Water Regulations for Lead and Copper, p. 26514).

water systems *without* corrosion control treatment, corrosion control treatment continues to be unnecessary and that in water systems *with* corrosion control treatment, the treatment is "optimized."[69]

Exactly *how* tap water is sampled can, *in and of itself*, keep a water system with significant lead-in-water contamination under the LCR lead action level (and leave the contamination unaddressed) or send the water system over the LCR lead action level (and trigger remedial requirements, including corrosion control treatment studies, implementation, optimization, and re-optimization).

In light of the fact that scientifically robust tap sampling designed to capture worst-case lead-in-water contamination in highest-risk homes is *foundational* to the proper implementation of the LCR,[70] we applaud EPA for proposing to prohibit sampling methods (i.e., pre-stagnation flushing and removal/ cleaning of faucet aerators prior to or during sample collection) known to temporarily reduce lead-in-water levels and yield results that underestimate the prevalence and/or severity of existing contamination. We are also pleased with EPA's proposal to require:

a. The use of wide-mouth collection bottles, which allow high water flow for sample collection, since low water flow can decrease the likelihood of capturing worst-case lead;[71] and
b. Public disclosure of results of all tap samples collected within 60 days of the end of each monitoring period.

These proposed revisions are long overdue. They will strengthen LCR's monitoring requirement and enable more meaningful community participation in the Rule's implementation and oversight.

Despite these important improvements, however, EPA's proposed lead (and copper) monitoring requirements would still leave worst-case lead-in-water levels undetected in many water systems across the US. We urge EPA to make the below changes so that water sampling under the LCR reflects the best available peer-reviewed science and aligns fully with the public health goals of the Rule:

a. **The sampling protocol for lead must be tightened**: All water systems must be required to adopt an *EPA-prescribed* sampling protocol that:

    → Explicitly specifies the need for high water flow (i.e., with the tap fully open) and explicitly prohibits the use of low water flow to fill collection bottles,

---

[69] Under the LCR, "optimized" corrosion control treatment has two meanings: a) for small and medium water systems, it refers to treatment that allows the water system to meet the LCR lead action level exceedance, b) for large water systems, it refers to treatment that achieves the lowest possible levels of lead at consumer taps without violating any other national primary drinking water regulation (see the October 28, 2015 recommendations of National Drinking Water Advisory Council (NDWAC) LCR work group dissenting member Yanna Lambrinidou, PhD).

[70] "Targeting monitoring to worst-case conditions will help systems and States evaluate the reductions in contaminant levels achieved through treatment and determine when 'optimal' treatment is being maintained to the degree most protective of public health" (Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals (MCLGs) and National Primary Drinking Water Regulations for Lead and Copper, p. 26514).

[71] See, for example, Clark, B., S. Masters, and M. Edwards. 2014. Profile Sampling to Characterize Particulate Lead Risks in Potable Water. *Environmental Science & Technology* 48(12):6836-6843; Masters, S., J. Parks, A. Atassi, and M. Edwards. 2016. Inherent Variability in Lead and Copper Collected During Standardized Sampling. *Environmental Monitoring and Assessment* 188(3):177.

- → Explicitly specifies that there is no ceiling on stagnation time prior to sampling (EPA's 2004 LCR guidance states this clearly: "There is no outer limit on standing time."),[72] and
- → Prohibits *any and all* sampling instructions that might artificially lower lead-in-water levels at the time of sampling, not just pre-stagnation flushing and removal/cleaning of faucet aerators.

Any water system modifications to this protocol must be explicitly prohibited.

Should EPA leave its proposal unchanged, it must disclose the peer-reviewed science showing how a sampling protocol without these restrictions would maximize a water system's chances of capturing worst-case lead-in-water levels for regulatory compliance monitoring.

b. **The sampling protocol for lead must be expanded for water systems with lead service lines (and/or service lines of unknown material)**: It is ironic that, despite EPA's new and intensified focus on the hazards of lead service lines, the agency's proposed revisions to the Rule's tap monitoring requirement include *no assessment whatsoever* of lead levels in lead service line water. This seems like an unconscionable oversight. We urge EPA to develop a science-based sampling protocol designed to capture worst-case lead levels at homes with a lead service line (and/or a service line of unknown material). Industry-funded research shows that if such a protocol were to be adopted, 54-70% of water systems with lead service lines (serving approximately 74-96 million people) would exceed the LCR lead action level.[73] This means that today, most residents in lead service line homes likely face a lead-in-water problem severe enough to trigger emergency remedial requirements and that these requirements are not being triggered because their water systems use a sampling protocol that, *by design*, routinely and systematically misses worst-case lead service line lead.[74]

Under the revised LCR, we recommend that water systems be required to adopt one of two *EPA-prescribed* sampling protocols, based on whether they serve homes with lead service lines (and/or service lines of unknown material):

---

[72] See November 23, 2004 EPA memo (US Environmental Protection Agency. 2004. Memorandum: Lead and Copper Rule – Clarification of Requirements for Collecting Samples and Calculating Compliance).

[73] Slabaugh, R. 2014. Optimized Corrosion Control—An Estimate of National Impact (Power Point presentation). AWWA Water Quality Technology Conference (WQTC), New Orleans, LA, Nov. 16-20.

[74] "The sampling protocol used for LCR compliance purposes was designed to capture primarily interior sources of lead (i.e., lead-containing solder and lead-containing brass) as well as some LSL water. Today, however, interior sources of lead have diminished because they contain a relatively limited mass of lead, and because many premise plumbing components have been replaced with components that contain lower levels of lead, especially in the pre1986 sampling pool of residences (see Triantafyllidou & Edwards 2012, Table 1 and discussion; http://www.tandfonline.com/doi/abs/10.1080/10643389.2011.556556). On the other hand LSLs, which are 100% lead by weight, pose an *increased* risk to human health for many reasons (e.g., lead scale accumulates with time and can increasingly crack and flake with age, water conservation practices lengthen the contact time between water and LSLs, and the water in many PWSs is more corrosive due to higher chloride, the presence of chloramine, and the absence of chlorine) (see Marc Edwards' 2014 webinar talk to the NDWAC LCR WG; https://epawebconferencing.acms.com/p71sx757mi9/?launcher=false&fcsContent=true&pbMode=normal). In other words, today LSLs pose a far greater risk to human health relative to any other lead-bearing plumbing material in a PWS's distribution system, and this disparity is likely to increase with time" (Lambrinidou, Y. 2015. Dissenting Letter to the EPA National Drinking Water Advisory Council (NDWAC), footnote 4).

- → If they serve no homes with a lead service line (and/or a service line of unknown material) *and have the necessary documentation to prove it*, they must be allowed to use a 1st-draw only sampling protocol, under the condition that this protocol's inherent limitations are clearly disclosed.[75]
- → If they do serve homes with a lead service line (and/or a service line of unknown material), they must be required to use a sampling protocol with *at least* one 1st-draw sample in order to capture potential contamination from lead solder, leaded brasses, bronze fittings, and other lead-bearing plumbing materials, and *at least* one 2nd-draw sample that has *maximal* likelihood of capturing worst-case lead levels from lead service line water.[76]

Any water system modifications to these protocols must be prohibited.

Should EPA leave its proposal unchanged, it must disclose the peer-reviewed science that shows how a single 1st-draw sampling protocol in a >15 mg/L LCR lead action level regime and a >10 mg/L trigger level scheme maximizes the chances of capturing worst-case lead levels in lead service line homes and achieves maximal human health protection by reducing lead at consumer taps to as close to the Maximum Contaminant Level Goal (MCLG) as feasible, as required by the LCR.

c. **The required number of high-risk homes sampled per monitoring cycle must be significantly increased to achieve statistical representation**: In cities with millions of customers, the LCR requires water systems to assess the extent and severity of lead-in-water contamination and the potential need for remediation on the basis of 100 (under standard monitoring conditions) or 50 (under reduced monitoring conditions) tap samples. The table below shows the required number of regulatory compliance samples for all three system sizes:

System size (number of people served)	Number of sites (standard monitoring)	Number of sites (reduced monitoring)
>100,000	100	50
10,001 to 100,000 ...	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
<=100	5	5

Given the inherent variability in lead release and the diverse conditions across many water distribution systems that can result in dramatically different patterns of lead corrosion and lead

[75] EPA, State regulatory agencies, and water systems must openly acknowledge that, due to the inherent and dramatic variability of lead release, *no 1st-draw sampling* can be presumed to capture worst-case lead at any single tap. See, for example, Schock, M. R. and F. G. Lemieux. 2010. Challenges in Addressing Variability of Lead in Domestic Plumbing. *Water Science & Technology: Water Supply* 10(5):792-798; Masters, S., J. Parks, A. Atassi, and M. Edwards. 2016. Inherent Variability in Lead and Copper Collected During Standardized Sampling. *Environmental Monitoring and Assessment* 188(3):177.

[76] Michigan's State-specific LCR, for example, requires a 5th-liter compliance sample for all homes with a lead service line.

release in individual buildings, it seems obvious that current LCR sampling requirements are not sufficient to achieve statistical representation and enable scientifically robust assessments of contamination and appropriate remediation. **Should EPA leave these numbers unchanged, it must provide a scientific analysis that shows the statistical representation of current requirements or it must demonstrate that statistical representation of the number of samples collected is unnecessary for achieving the Rule's public health protective goal.**

d. **Lead-in-water sampling must occur in the warmest summer months, especially when water systems are in exceedance of the LCR lead action level**: Research cited in the current LCR shows that lead-in-water levels tend to increase in the summer. For this reason, the LCR and the proposed revisions to the LCR require water systems that monitor annually to collect all samples in June, July, August, or September. For systems in exceedance of the LCR lead action level that monitor every six months this requirement is dropped. We recommend that the revised LCR make it mandatory for water systems collecting compliance samples every six months to conduct one monitoring cycle in June, July, August, or September and the other in December, January, February, or March respectively. Concomitantly, we recommend that six-month monitoring programs, which systematically miss the warmest months of the year be explicitly prohibited. **Should EPA leave its proposal unchanged, it must disclose the peer-reviewed science showing how regulatory compliance sampling that does not target the warmest summer months routinely captures worst-case lead levels in a service area.**

e. **The LCR lead action level must ultimately be reduced to 5 mg/L**: 5 mg/L is the current Canadian standard (and the proposed EU standard). Most water systems with corrosion control that meets the LCR's science-based optimization criteria and lead-reduction standards, and with proactive full lead service line replacement programs will be able to meet this action level.

f. **Lead monitoring must be conducted in high-risk homes *within* high-risk water quality zones**: In light of the fact that within any given distribution system (small, medium, or large) water quality – and, thus, water corrosivity – in different geographical areas can vary significantly, the LCR's requirements for lead and copper monitoring at high-risk sites, optimized water quality parameters, and optimized corrosion control treatment must be revised to ensure that worst-case lead-in-water levels are indeed captured and that water quality parameters and corrosion control treatment are properly adjusted to address worst-case conditions. If the challenge of water quality zones is left unaddressed, assessments of lead release in any given system can be erroneous, "optimized" water quality parameters and corrosion control treatment can be sub-optimal, and water system assurances of safety can be grossly deceiving. **Should EPA decide against addressing this problem, it must provide its rationale and the peer-reviewed science that supports it.**

g. **Copper monitoring must be conducted in homes with new copper plumbing**: Because copper plumbing poses the greatest health risk when it is new, regulatory compliance monitoring for copper must capture worst-case copper levels in homes with the highest risk of copper-in-water contamination – namely:

   → Older homes with newly updated copper plumbing materials (if these homes also have a lead service line, they would meet LCR Tier 1 criteria for both lead and copper, but identifying them might be difficult), or
   → New homes with copper plumbing (these homes would be easy to identify through property tax housing records and water connection records).

Although we appreciate EPA's effort to prioritize lead service line homes for lead-in-water sampling, we are concerned that this focus will render the LCR *completely incapable* of assessing and protecting consumers from copper contamination. **We urge EPA to correct this oversight. If it does not, this will be a case of regulatory backsliding, unless EPA is able to provide peer-reviewed science showing how regulatory compliance sampling for copper in homes with old copper plumbing maximizes the chances of capturing worst-case copper levels in a service area, as required by the LCR. To our knowledge, this scheme is inconsistent with current scientific understanding.**[77]

h. **Triennial tap monitoring and tap monitoring every nine years must be strictly prohibited for *all* water systems**: Because the LCR's ultimate goal "is to provide maximum human health protection by reducing the lead and copper levels at consumers' taps to as close to the MCLG [Maximum Contaminant Level Goal] as is feasible,"[78] the Rule requires routine tap monitoring even *after* optimized corrosion control treatment is implemented. This monitoring is intended to assess the effectiveness of the treatment employed. But it is also designed as an ongoing protective measure to ensure that any inadvertent rise in lead is promptly detected. This is because water distribution systems are dynamic, not static. Planned and unplanned changes to source water, treatment, plant operations, and the distribution system may have impacts on lead levels at the tap that are not always predictable or may not always be sufficiently understood.[79] These changes can result in lead-in-water elevations even in water systems that meet the LCR lead action level and have corrosion control treatment that is deemed "optimized." Allowing water systems to:

   → Reduce LCR compliance sampling to once every three or nine years, and
   → Target a reduced number of an already very small number of required sampling sites,

   simply because prior 1st-draw lead-in-water samples yielded 90th percentile values ≤10 mg/L, leaves consumers entirely unprotected from active-but-missed or future-and-unplanned lead-in-water contamination events. Moreover, it leaves water systems without statistically robust data, which are necessary for understanding the causes of lead-in-water problems, when such problems are detected, and for addressing them effectively. For this reason, we urge EPA to prohibit triennial and every-nine-year sampling for *all* systems.

   Should the agency leave its proposal unchanged, it must present the peer-reviewed science showing how:

---

[77] See, for example, Edwards, M., et al. 2001. The Role of Pipe Ageing in Copper Corrosion By-Product Release. *Water Supply* 1(3):25–32; Schock, M. R. and A. M. Sandvig. 2009. Long-Term Impacts of Orthophosphate Treatment on Copper Levels. *Journal AWWA* 101(7):71-82; Turek, N. F., et al. 2011. Impact of Plumbing Age on Copper Levels in Drinking Water. *Journal of Water Supply: Research and Technology – Aqua. IWA* 60(1):1-15; Grace, S., D. A. Lytle, and M. N. Goltz. 2012. Control of New Copper Corrosion in High-Alkalinity Drinking Water. *Journal AWWA* 104(1):E15-E25.

[78] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26478.

[79] For example, lead leaching can fluctuate seasonally; it can also increase with time, as lead-bearing plumbing ages, or due to exposed iron in water mains, or even due to something as simple as a storm that alters chloride levels in the water.

- → **Lead-in-water levels in a small number of taps are representative of lead-in-water levels across a service area and adequate for assessing corrosion control treatment effectiveness, and**
- → **Reduced monitoring does *not* compromise a) water systems' ability to detect, understand, and address lead-in-water contamination events, and b) the LCR's capacity to protect public health.**

i. **Digestion of all lead-in-water samples, irrespective of turbidity screening results, must be required**: In light of the fact that there is no good data to show that turbidity is a reliable predictor of lead particle presence in tap water samples, we urge EPA to require digestion of *all* LCR compliance samples so that *all* lead particles captured are properly detected and their lead content is fully measured. **Should EPA leave its proposal unchanged, it must disclose the peer-reviewed science showing how turbidity screening is a reliable predictor of the presence of all sizes of lead particles in tap water samples.**

j. **EPA's proposed transparency requirement must be expanded**: To ensure meaningful community participation in the Rule's implementation and oversight, we urge EPA to require water systems to make public not only the results of all tap samples, but also:

- → The sampling protocol used,
- → Full addresses of the homes sampled as well as evidence that these homes met the LCR's proper Tiering criteria,
- → Any and all changes to the pool of homes sampled and explanations for why sites were dropped and/or added, and
- → Complete documentation and thorough explanations of any and all sample invalidations.

Should EPA leave its proposal unchanged, it must explain how its limited transparency requirement aligns with the agency's responsibility to promote and protect environmental justice.

k. **Sample invalidation allowances must be tightened**: To prevent water system manipulation of lead-in-water results, we urge EPA to explicitly prohibit sample invalidation *after* a sample has been analyzed.[80]

10. WATER QUALITY PARAMETER MONITORING

a. **Water quality parameters**: In its proposed revisions to the LCR, EPA suggests changing the list of target water quality parameters from:

- → pH
- → Alkalinity
- → Calcium
- → Conductivity
- → Orthophosphate (if the corrosion inhibitor was phosphate-based)

[80] A November 23, 2004 EPA memo already prohibits this practice (US Environmental Protection Agency. 2004. Memorandum: Lead and Copper Rule – Clarification of Requirements for Collecting Samples and Calculating Compliance).

→ Silica (if the corrosion inhibitor was silicate-based)
→ Temperature

to

→ Lead
→ Copper
→ pH
→ Alkalinity
→ Orthophosphate (when an orthophosphate-based inhibitor is used)
→ Silicate (when a silicate-based inhibitor is used)

This revision eliminates calcium, conductivity, and temperature from the original list because research has shown that "calcium carbonate stabilization is ineffective at preventing corrosion in lead and copper pipes." Although this may very well be true, according to EPA lead corrosion expert Mike Schock, knowing calcium levels can still provide important information about the nature and condition of protective lead scales in lead service lines.[81] Same for temperature.

EPA's revised list also continues to omit additional water quality parameters known to have potentially significant impacts on lead corrosion and lead release in tap water (e.g., chlorides, sulfates, manganese, iron, aluminum, and the formation/dissolution of protective scales in lead service lines). This, despite the fact that, according to recent peer-reviewed studies, monitoring pH, alkalinity, orthophosphate, and silicate values alone would render impossible the development of meaningful estimations about something as basic as the existence and nature of protective lead scales in a water system's lead service lines.[82] In short, EPA's narrowed-down list can result in routine water system failures to identify and control water quality factors that play a significant role in inhibiting or exacerbating lead corrosion in their water distribution system. Given:

→ The available peer-reviewed science on associations between lead corrosion and water quality parameters other than pH, alkalinity, orthophosphate, and silicate, and
→ The LCR's ultimate goal of providing "maximum human health protection by reducing the lead and copper levels at consumers' taps to as close to the MCLG [Maximum Contaminant Level Goal] as is feasible,"[83]

we urge EPA to expand the proposed water quality parameter list to *all* the factors known to significantly impact lead corrosion and lead release. Should EPA leave its proposed list unchanged, it must provide a scientifically defensible justification for its narrow scope.

---

[81] Personal communication, February 3, 2020.

[82] See, Schock, M. R., et al. 2014. Importance of Pipe Deposits to Lead and Copper Rule Compliance. *Journal AWWA* 106(7):E336-E349; Wasserstrom, L. W., et al. 2017. Scale Formation Under Blended Phosphate Treatment for a Utility With Lead Pipes. *Journal AWWA* 109(11):E464-E478; Tully, J., M. K. DeSantis, and M. R. Schock. 2019. Water quality–Pipe Deposit Relationships in Midwestern Lead Pipes. *AWWA Water Science* 1(2):e1127).

[83] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26478.

b. **Small and medium water system water quality parameter monitoring**: Water quality parameter monitoring in small and medium water systems must occur routinely, must occur independently of any LCR lead trigger level or lead action level exceedance, and must include sampling at the same time as compliance monitoring for lead and copper. This scheme will yield data that is necessary for assessing the causes of a LCR lead action level exceedance, should such an exceedance occur. In the absence of consistent water quality monitoring – before, during, and after a LCR lead trigger level or lead action level exceedance – small and medium water systems have little capacity to conduct meaningful investigations of a contamination event and to develop scientifically sound responses.

c. **Water quality zones**: In light of the fact that within any given distribution system (small, medium, or large) water quality – and, thus, water corrosivity – in different geographical areas can vary significantly, the LCR's requirements for lead and copper monitoring at high-risk sites, optimized water quality parameters, and optimized corrosion control treatment must be revised to ensure that worst-case lead-in-water levels are indeed captured and that water quality parameters and corrosion control treatment are properly adjusted to address worst-case conditions. If the challenge of water quality zones is left unaddressed, assessments of lead release in any given system can be erroneous, "optimized" water quality parameters and corrosion control treatment can be sub-optimal, and water system assurances of safety can be grossly deceiving. **Should EPA decide against addressing this problem, it must provide its rationale and the peer-reviewed science that supports it.**

d. **Find-and-fix water quality parameter monitoring**: EPA states that, "Under the current LCR, water systems that have [corrosion control treatment] must monitor water quality parameters to ensure effective [corrosion control treatment]." In reality, water quality parameters that remain within State-designated ranges *do not* and *cannot*, in the absence of tap water sampling, confirm that any given corrosion control treatment continues to be "optimized." Similarly, water quality parameters that fall outside established ranges *do not* and *cannot*, without tap water sampling, establish that any given corrosion control treatment is no longer "optimized." *In other words, although different water quality parameter ranges tend to support corrosion control treatment optimization in different systems, there is no direct predictive relationship between water quality parameters and lead-in-water levels at home taps*.[84] Yet, EPA's find-and-fix water quality parameter monitoring requirement is based on the presumption that such a relationship exists. EPA states that:

> *"If any of the [water quality parameters] are off-target, such as pH or indicators of [corrosion control treatment], then the water system may be able to determine how large the problem is, and if it includes the whole water system, a specific area, or the sole residence with the lead action level exceedance. The additional [water quality parameter] sample taken will aid in the determination of the potential cause of elevated levels of lead so that appropriate actions can be carried out."*

Should EPA leave its proposal unchanged, it must cite the peer-reviewed science showing the capacity of water quality parameters to predict lead-in-water elevations at home taps and assess corrosion control treatment optimization.

---

[84] See the October 28, 2015 recommendations of National Drinking Water Advisory Council (NDWAC) LCR work group dissenting member Yanna Lambrinidou, PhD.

e. **Additional water quality parameter requirements**: EPA proposes to make stricter the conditions under which water systems would be able to reduce the frequency of water quality parameter monitoring and to lower the number of sites they monitor. Specifically, under the revised Rule, for a water system to reduce its monitoring frequency to once a year, it would need to maintain the State-designated range of water quality parameter values *and* meet the 90th percentile lead trigger level for three consecutive years of standard monitoring. For a water system to further reduce its monitoring frequency to every three years, it would need to maintain the State-designated range of water quality parameter values *and* meet the 90th percentile lead trigger level for another three consecutive years of annual monitoring.

   We are concerned that these reductions can place water users at risk of long-term exposures to lead in water from active-but-missed or future-and-unplanned contamination events. Moreover, they can leave water systems without statistically robust data, which are necessary for understanding the causes of lead-in-water problems, when such problems are detected, and for addressing them effectively. For this reason, we urge EPA to prohibit water quality parameter monitoring that occurs only annually or every three years.

   Should EPA leave its proposal unchanged, it must disclose the peer-reviewed science showing how these reductions in water quality parameter monitoring do *not* compromise a) water utilities' ability to detect, understand, and address lead-in-water contamination events, and b) the LCR's capacity to protect public health.

11. Public Education and Sampling at Schools and Child Care Facilities

We appreciate EPA's attempt to address lead in water in schools and childcare facilities through the LCR, as lead in water in these buildings requires urgent national attention. We are concerned, however, that the agency's proposal goes against the best available peer-reviewed science and risks leaving school and childcare communities falsely assured and sub-optimally protected – if not entirely unprotected – from continued risk of preventable exposures. The EPA proposal correctly states that:

> *"Large buildings such as schools can have a higher potential for elevated lead levels because, even when served by a water system with well operated [Optimal Corrosion Control Treatment], may have longer periods of stagnation due to complex premise plumbing systems and inconsistent water use patterns."*

In light of the fact that a) school buildings present unique physical complexities and water-use particularities that can have a significant effect on lead levels at the tap and that necessitate comprehensive and multi-pronged approaches to lead detection and remediation, and b) the LCR is not designed to address either these complexities or these particularities, **we urge EPA to make significant changes to its proposal based on the best available peer-reviewed science in order to ensure maximal public health protection to children, infants, and pregnant women in schools and childcare facilities.**

Weaknesses we see in EPA's proposal include the following:

a. If the goal of the tap sampling requirement is to share lead-in-water measurements with schools and childcare facilities in order "to raise awareness and increase knowledge about the risks and likelihood of the presence of lead in drinking water," we believe that EPA is proposing an

intervention that is time-consuming, costly, and not designed to achieve its intended goal. This is because:

→ The tap sampling proposed is not appropriate for determining reliably the likelihood of lead in school and childcare facility drinking water:

- Due to the inherent variability in lead release mentioned above, a single 1st-draw sample from any individual tap can easily miss lead elevations to which schoolchildren, infants, and pregnant women might be exposed at other times, even when the tap is in a building with no lead service lines. Even more importantly, the proposed 18-hour cap on stagnation further reduces the likelihood of capturing worst-case lead that children, infants, and pregnant women ingest routinely (i.e., every Monday morning, following over 48 hours of stagnation, and every first day of school after holidays and seasonal breaks).

- Because lead-in-water levels can vary dramatically from one tap to another in the same building, sampling from only an arbitrary number of five taps in each school and two taps in each childcare facility *cannot* and *does not* predict lead-in-water levels at other taps, and *cannot* and *does not* paint any type of reliable overall picture of lead-in-water contamination at any given school or childcare facility. In short, no group of taps can be treated as "representative" vis-à-vis lead in water of all taps in a school or childcare facility.[85]

- Sampling every five years provides only a momentary snapshot of lead-in-water levels at the sampled taps. The inherent variability of lead release makes these samples extremely poor predictors of lead levels dispensed from these taps at other times and lead levels dispensed from different taps at any time.

- Finally, because lead-in-water levels in one building are not representative of lead-in-water levels in another,[86] a scheme wherein water systems would be required to conduct tap sampling and deliver results not to *all* the schools and childcare facilities in their service area but to a minimum of 20 percent, raises serious environmental justice concerns.

---

[85] See, Boyd, G. R., et al. 2008. Lead Release from New End-Use Plumbing Components in Seattle Public Schools. *Journal AWWA* 100:3:105-114; Boyd, G. R., et al. 2008. Lead Variability Testing in Seattle Public Schools. *Journal AWWA* 100:2:53-64; Deshommes, E., et al. 2016. Evaluation of Exposure to Lead from Drinking Water in Large Buildings. *Water Research* 99:46-55; Dore, E., et al. 2018. Sampling in Schools and Large Institutional Buildings: Implications for Regulations, Exposure and Management of Lead and Copper. *Water Research* 140:110-122.

[86] See, Boyd, G. R., et al. 2008. Lead Release from New End-Use Plumbing Components in Seattle Public Schools. *Journal AWWA* 100:3:105-114; Boyd, G. R., et al. 2008. Lead Variability Testing in Seattle Public Schools. *Journal AWWA* 100:2:53-64; Deshommes, E., et al. 2016. Evaluation of Exposure to Lead from Drinking Water in Large Buildings. *Water Research* 99:46-55; Dore, E., et al. 2018. Sampling in Schools and Large Institutional Buildings: Implications for Regulations, Exposure and Management of Lead and Copper. *Water Research* 140:110-122.

b. If the goal of the tap sampling requirement is to share lead-in-water measurements with schools and childcare facilities in order "to raise awareness and increase knowledge about the risks and likelihood of the presence of lead in drinking water," we believe that EPA is proposing an intervention that is time-consuming, costly, and incapable of achieving the LCR goal of reducing consumers' exposure to lead in drinking water "to the lowest levels feasible"[87] or the American Academy of Pediatrics (AAP) objective for water fountains in schools to "not exceed water lead concentrations of more than 1 part per billion."

c. The fact that this requirement:

   → Comprises a sampling scheme incapable of capturing worst-case lead levels to which schoolchildren, infants, and pregnant women are routinely exposed;
   → Is likely to generate misleading public education, false assurances of safety, and justifications for suboptimal remedial action (or remedial inaction); and
   → Lacks a remedial requirement;

   raises serious questions about its scientific and financial justification.

Should the agency leave its proposal unchanged, it must disclose:

a. **The peer-reviewed science showing how the tap sampling scheme it outlines will generate scientifically accurate public messaging and how this public messaging will, in turn, result in *scientifically-sound*, *measurable*, *overseeable*, and *enforceable* remedial actions that reduce exposures to lead in water, as required by the LCR; and**
b. **How it aligns with environmental justice principles.**

In reality, tap sampling is not necessary for raising awareness or increasing knowledge about the risks and likelihood of the presence of lead in school drinking water. Ample research exists about the health effects of exposures to (soluble and particulate) lead in water[88] as well as about the fact that as long as lead-bearing plumbing is in use, risk of contamination is present (and high), especially in buildings like schools and childcare facilities. We also know that the vast majority of schools and childcare facilities

---

[87] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26477.

[88] Triantafyllidou, S., J. Parks, and M. Edwards. 2007. Lead Particles in Potable Water. *Journal AWWA* 99(6):107-117; Edwards, M., S. Triantafyllidou, and D. Best. 2009. Elevated Blood Lead in Young Children Due to Lead-Contaminated Drinking Water: Washington, DC, 2001-2004. *Environmental Science & Technology* 43:1618-1623; Brown, M. J. 2011. Association Between Children's Blood Lead Levels, Lead Service Lines, and Water Disinfection, Washington, DC, 1998–2006. *Environmental Research* 111:67-74; Triantafyllidou, S. and M. Edwards. 2012. Lead (Pb) in Tap Water and in Blood: Implications for Lead Exposure in the United States. *Critical Reviews in Environmental Science and Technology* 42:1297–1352; Triantafyllidou, S., D. Gallagher, and M. Edwards. 2014. Assessing Risk with Increasingly Stringent Public Health Goals: The Case of Water Lead and Blood Lead in Children. Journal of Water and Health 12(1):57-68; Edwards, M. 2014. Fetal Death and Reduced Birth Rates Associated with Exposure to Lead-Contaminated Drinking Water. *Environmental Science & Technology* 48:739-746; Hanna-Attisha, M., J. LaChance, R. C. Sadler, and A. C. Schnepp. 2016. Elevated Blood Lead Levels in Children Associated with the Flint Drinking Water Crisis: A Spatial Analysis of Risk and Public Health Response. *American Journal of Public Health* 106:283-290; Pieper, K. J. 2018. Elevated Lead in Water of Private Wells Poses Health Risks: Case Study in Macon County, North Carolina. *Environmental Science & Technology* 52:4350−4357.

have lead in their plumbing because they were built before the 1986 Lead Ban. Even brand-new buildings with fixtures labeled "lead free" are rarely lead free and can still leach lead.[89]

We, therefore, urge EPA to center this requirement on routine and robust public education that supports school and childcare communities to make informed, science-based decisions about *immediate* adoption of effective protective measures at *all* taps used for drinking and cooking, irrespective of how these taps test during any one-time sampling event.[90]

Whatever information is to be provided must be *EPA-prescribed* and developed through a collaboration with lead corrosion experts who have a demonstrated record of prioritizing public health, as well as affected members of diverse marginalized communities and grassroots clean water and environmental justice groups – who have first-hand experience with lead in water in homes, schools, and childcare facilities. Leaving public education delivery about schools and childcare facilities to water systems alone raises serious concerns about dissemination of misinformation because to date a) EPA's messaging about this matter in the 3Ts (Training, Testing and Taking Action) and the proposed LCR revisions has been incomplete and, in some areas, flawed, and b) in contrast to EPA's assertion, water systems have tended to distance themselves from school water issues and, thus, have not generally developed expertise on lead in water in schools and childcare facilities.[91]

12. FIND-AND-FIX

We appreciate EPA's intent to follow-up with remedial actions when a 1st-draw compliance sample measures >15 mg/L. We are concerned, however, that the proposed requirement lacks a scientific basis, is haphazard and arbitrary, and risks leaving affected residents inadequately protected, if not entirely unprotected, from ongoing lead-in-water exposures. Specifically, EPA proposes the following actions:

a. Providing the >15 mg/L result to the affected customers within 24 hours of receiving it (as opposed to the current Rule's 30 days).

b. Collecting a follow-up sample within 30 days of receiving the initial result to try and determine the source of the elevated lead levels – this sample may involve different volumes and sampling methods. If the water system is unable to regain access to the target home, collecting this follow-up sample from a different home "within close proximity" and with "similar structural characteristics."

---

[89] Parks, J. et al. 2018. Potential Challenges Meeting the American Academy of Pediatrics' Lead in School Drinking Water Goal of 1 µg/L. *Corrosion* 74(8):914-917.

[90] Public education must disclose, for example, that no level of lead in water is safe for human consumption; lead-bearing plumbing in schools and childcare facilities is prevalent; even the best corrosion control treatment does not eliminate contamination; the risk of lead in water in schools and childcare facilities is especially high; common tap sampling methods are not reliable indicators of routine human exposures; and filters certified to remove soluble and particulate lead tend to be a good alternative to unfiltered tap water.

[91] In its proposed revisions, EPA asserts that "Water systems have developed the technical capacity to do this work in operating their system and complying with current drinking water standards." In practice, operating a water system and complying with LCR requirements is completely divorced from lead in water in schools. The LCR does not address schools – at all.

c. If the follow-up sample measures ≤15 mg/L, providing the result to the affected customers within 30 days of receiving the result; if the follow-up sample measures >15 mg/L, providing the result to the affected customers within 24 hours of receiving the result.

d. If the water system has corrosion control treatment, collecting a water quality parameter sample within five days of receiving the result to help assess if corrosion control treatment is optimized; should the water system choose, reviewing "distribution system operations or other factors to determine the cause of elevated lead level"; remedial measures can include system-wide adjustment to corrosion control treatment, flushing portions of the distribution system, or other actions to reduce contamination and must be recommended to the State within six months of the end of the monitoring period in which the initial sample first exceeded 15 mg/L; the State would have six months to approve the recommendation.

e. If the water system does not have corrosion control treatment, it can recommend implementation of such treatment.

Although we are pleased to see the 24-hour notification proposal, we have concerns about the fact that such notification is not coupled with remediation requirements for affected homes. Moreover, given the:

a. Very small number of homes water systems are required to sample for regulatory compliance;
b. Inherent variability in lead release; and
c. Use of a 1st-draw only sampling protocol, which is not designed to capture worst-case lead in lead service line water;

it seems to us that the proposed find-and-fix program attaches vague, but potentially system-level, remedial requirements to a whack-a-mole method of lead detection. Specifically, find-and-fix is to be triggered only when a home *happens* to make it into a water system's small sampling pool, and the sampled tap in that home *happens* to dispense lead >15 mg/L in a 1st-draw sample *at the time of sampling*. Any change in the water utility's sampling pool, sampling protocol, or day/time of sample collection can result in lead-in-water detections >15 mg/L in a *different* subset of homes, which can lead the same water system down a different path of trying to address different sets of contamination problems, in different neighborhoods, with different methodologies, and different "solutions."

It is difficult to comprehend how a regulatory program that can end up requiring an intervention as drastic as systemwide adjustment to corrosion control treatment or corrosion control treatment implementation, can be triggered by a non-methodical and not scientifically robust approach to lead detection in a *single home* or a *small number of homes*, and can be implemented through a broad, vague, and flexible menu of diagnostic and treatment interventions.[92]

In light of the fact that a snapshot lead-in-water level >15 mg/L signals:

---

[92] By contrast, in her dissenting letter to NDWAC, Yanna Lambrinidou, PhD proposed a find-and-fix program that would be triggered *by a significant change in either water quality parameters or 90th percentile values and would require mandatory increased tap monitoring and the launch of a find*-and-fix process involving corrosion control treatment adjustments or other appropriate remedial actions (see, October 28, 2015 recommendations to National Drinking Water Advisory Council (NDWAC)).

a. Significant lead-in-water contamination at the sampled home, and
b. Potentially significant lead-in-water contamination at neighboring homes and throughout a service area,

we recommend that the proposed find-and-fix program be changed to require water systems to:

a. Schedule a consultation with the residents of the sampled home within 24 hours of receiving the sampling results to offer them lead-certified POU filters and information about additional measures they can take immediately to prevent exposures;
b. Conduct a comprehensive assessment of the source/s of lead at the sampled home, using a scientifically robust methodology (that follows *EPA-prescribed* instructions and includes sequential sampling) and offer residents recommendations for possible ways to start eliminating confirmed source/s of contamination;
c. If the home has a lead service line, conduct a full lead service line replacement; and
d. Issue prompt systemwide public education alerting all residents to the contamination, informing them that similar or higher lead levels can be dispersed at other homes/buildings as well, and disclosing basic facts about lead in water (e.g., its prevalence, conditions that favor its release, the unpredictability of its release, health risks from ingestion, steps to prevent exposure). This messaging must aim at increasing resident awareness *in order to help change residents' daily water use practices* in ways that are known to minimize lead exposures at all times.

Should EPA leave its find-and-fix proposal unchanged, it must disclose the peer-reviewed science supporting it. Questions that must be answered include but are not limited to: On what scientific basis and with whose scientific expertise will the follow-up sampling protocol be determined? What best available peer-reviewed science justifies the allowance of investigating one home's lead-in-water contamination by sampling a neighboring home with "similar structural characteristics"? What best available peer-reviewed science justifies water quality parameter investigations that are limited to lead, copper, pH, alkalinity, orthophosphate (when an orthophosphate-based inhibitor is used), and silicate (when a silicate-based inhibitor is used) and exclude additional potentially influential parameters such as chlorides, sulfates, manganese, iron, aluminum, and the formation/dissolution of protective scales in lead service lines?

Finally, should EPA leave its proposal unchanged, it must disclose the peer-reviewed science supporting it and make clear what mechanisms the find-and-fix requirement will include to prevent perpetuation of environmental injustice from vastly uneven water system responses to individual >15 mg/L compliance sampling results (e.g., based on a system's resources or on who the affected residents are and what neighborhoods they reside in).

13. Rule Implementation and Enforcement

a. **Service line material verification**: As we state above in Section 5 (Lead Service Line Inventory), we recommend that acceptable methods for verifying service line material are prescribed by EPA, which has the appropriate technical expertise (rather than States, which often don't).

b. **Lead service line replacement following trigger level exceedance**: As we stated above in Section 3 (Lead Trigger Level), medium and large water systems with lead service lines (and/or service lines of unknown material) that exceed the lead trigger level must be required to implement full

lead service line replacement programs that comply with basic *EPA-prescribed* standards and goals for *actual* lead service line replacement. Moreover, these standards and goals *must be enforceable*. EPA's proposal that each water system be left on its own to develop a full lead service line replacement program and a goal for this program (both of which are to be approved by the State oversight agency), leaves room for:

- → Significant variation in lead service line replacement programs from water system to water system (e.g., one water system might decide to replace all its lead service lines in 10 years, while another in 80 years or never) and, therefore, uneven public health protection, and
- → Systematic perpetuation of environmental injustice, given EPA's recommendation that water systems develop their programs on the basis of several factors, including "*the financial circumstances of the water system and its customers*." (emphasis added)

c. **Compliance with find-and-fix requirements**: EPA must explain what lead corrosion expertise is available in State regulatory agencies for technical support, so that water systems can implement this requirement in a scientifically sound manner. If there is lack in necessary expertise, EPA must provide a realistic vision for how this requirement will work to reliably advance public health.